DELAYS, TECHNICAL PROBLEMS, AND COST ESCALATION IN THE FEDERAL AVIATION ADMINISTRATION'S ADVANCED AUTOMATION SYSTEM

(103–8)

Y 4.P 96/11:103-8

Delays, Technical Problems, and Cos...

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THE

SUBCOMMITTEE ON AVIATION

OF THE

COMMITTEE ON
PUBLIC WORKS AND TRANSPORTATION
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

FIRST SESSION

MARCH 10, 1993

Printed for the use of the
Committee on Public Works and Transportation

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HOUSE OF REPRESENTATIVES,
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, DC, March 5, 1993.

To: Members of the Subcommittee on Aviation.
From: Committee's Aviation Staff.
Re Summary of subject matter for Aviation Subcommittee hearing on Delays, Technical Problems, and Cost Escalation in Federal Aviation Administration's Advanced Automation System Program on Wednesday, March 10, 1993 at 10:00 a.m.

The Subcommittee will receive testimony on problems encountered in development of the Federal Aviation Administration's Advanced Automation System (AAS) program and steps being undertaken to rectify those problems. The AAS program is the centerpiece of the FAA air traffic control modernization program. The AAS program's purpose is to replace and upgrade the computers, software and air traffic controller workstations and displays used to control and separate air traffic.

I. AIR TRAFFIC CONTROL MODERNIZATION

Further detail on AAS will be provided later in the Summary, but first, in order to provide some context for the AAS program, a general description of the air traffic control modernization effort will be provided.

The air traffic control system is a complex web of radars, computers, weather detection systems, navigation beacons, control towers, enroute centers and people, tied together through a network of telecommunications links.

Approximately 550 airports have FAA air traffic control towers which control aircraft in the vicinity of airports. Of these airports, 289 use radar to control aircraft on their approaches and departures. There are also 21 Air Route Traffic Control Centers or enroute centers which control aircraft at higher altitudes between airports.

In addition, there are approximately 1,325 navigation beacons of different types around the country that transmit radio signals enabling pilots to determine where they are. There are also 759 airports equipped with FAA instrument landing systems which enable pilots to make precision approaches to runways in less than optimum weather conditions. The FAA also has a wide variety of facilities and equipment for collecting and making available to pilots weather data, including the Flight Service Station system used by general aviation pilots.

This air traffic control system is designed and expected to operate constantly around-the-clock with a very high level of reliability.

In 1981, the Federal Aviation Administration proposed a National Airspace System Plan (NAS Plan) to replace or upgrade all of the equipment used in the air traffic control system over a 10–

20 year period. The NAS Plan consisted of approximately 90 independent modernization projects that when completed, will be linked in an overall integrated system.

The 90 projects include replacing aging telecommunications equipment and switches, radars, radio equipment, landing systems, weather detection systems, data processing equipment, navigation beacons, and equipment used to display air traffic.

The NAS Plan was needed because most of the facilities and equipment in the air traffic control system were antiquated in a technological sense. In many key equipment areas this remains the case. For instance, the computer generated radar displays used by air traffic controllers to separate air traffic were designed in the late 1960s and were deployed in the early 1970s. In some cases, the communications equipment being used is of an even earlier vintage. Some navigation equipment even bears the insignia of the FAA's pre-1958 predecessor the Civil Aeronautics Administration. By contemporary standards, much of the technology used in air traffic control has become increasingly costly to maintain and technologically inflexible.

Overall, the modernization effort has been to build a new air traffic control system that is more reliable, less costly to maintain, requires fewer people to operate, and provides improved operating efficiencies to the airlines and the traveling public.

In 1982, the Congress enacted the Airport and Airway Improvement Act which authorized funding to carry out the Plan through 1987, and in 1987, Congress again authorized funding to implement the NAS Plan through FY 1990. In 1990, Congress reauthorized funding to implement the Plan and expanded the scope of the Plan beyond the original 90 projects to take in additional and newly identified capital development needs. Much of these new needs were of a "low-tech" nature such as building replacement, repairs or upgrades. This plan was renamed the Capital Investment Plan (CIP) to reflect the broader scope and purpose of the modernization effort.

Through 1993, approximately $16 billion has been appropriated for air traffic control modernization. Through the early part of the next century, the FAA has identified another $15.5 billion that will be needed to meet its F&E capital development needs. The FY 1993 budget spends a total of $2.4 billion. It is anticipated that an annual level of comparable spending or a little higher will be needed for the balance of the century to sustain the modernization effort.

The FAA estimates that the approximate $31.5 billion to be spent on modernization between 1982 and the year 2000 will result in substantial financial benefits to aviation users and cost savings to the FAA throughout enhanced productivity and efficiency. However, because of program delays, virtually none of these benefits have yet been realized.

When measured in terms of 1991 dollars, the FAA estimates that modernization projects implemented, underway or planned will bring a total of $257.9 billion in benefits to aviation users and the agency over the life of equipment being modernized. For the most part, the benefits will be realized between 1995 and the years 2015–2020.

Specifically, FAA estimates that approximately $148 billion will be realized in the value of time saved, by airline passengers through reductions in delays; $63 billion in reductions in aircraft direct operating costs; and $9.5 billion in safety benefits. The savings to the operating expenses of the FAA have been identified as $31.9 billion, mostly in the form of improved controller and maintenance productivity.

Beyond these calculable economic benefits, the modernization program is expected to provide a technological system that is much more sophisticated and more adaptable, flexible and receptive to new technological innovation than what it is replacing. Hence, it is expected to be more responsive to future aviation user needs as they develop.

Also aside from quantifiable benefits, there is simply no choice but to replace much of the equipment if the system is to operate in the safe and efficient manner the public expects. For a number of systems, spare parts availability has become a problem due to cessation of manufacturing; in some cases, maintenance must be accomplished through cannibalization. In short, obsolete equipment will only become more so if upgrades are not made. The effect of not modernizing the system will be inadequate and shrinking capacity and unfulfilled demand.

Over the past 10 years, the air traffic control modernization effort has been a mixed bag of accomplishments and frustrations. For the most part, the frustration has far outweighed the sense of progress and accomplishment. Like most large government programs involving development and procurement of complex, technological systems, the modernization program has been plagued with delays, cost escalation, and, sometimes, failures to meet technical specifications.

The problems encountered during the 1980s have been largely attributed to the FAA, early on, grossly underestimating the complexity and difficulty of the modernization task. In the early 1980s, it was largely assumed that much of the modernization plan would be implemented with off-the-shelf technology, with little need for modification. It was anticipated that where modification was needed it would be minimal and understandable. This assumption has proved fallacious. Practically all systems in the NAS Plan involved substantial research, development, and new design, and because of this, the initial schedules, for completion of projects were extremely optimistic. Delays from the original optimistic schedules quickly became a matter of years.

Also, the FAA has established very high technical specifications particularly with regard to equipment reliability. Meeting these specifications has proved difficult and unpredictably time consuming for the companies with which the FAA contracted to develop and implement the technology.

Another problem has been the failure of contractors to deliver what was specified in the contract. For instance, in one of the major acquisitions, the contractor outright failed to deliver the systems and was eventually terminated by the FAA and found in default, at a high level of cost and delay to the government.

All of these problems have led to changes in the way the FAA goes about designing and procuring new air traffic control systems.

Some of these are the result of hearings and legislation developed by the Subcommittee on Aviation.

Among the changes brought about by legislation and internal agency changes were elimination of redundant reviews of procurement decisions by the Department of Transportation; an increase in acquisition-related staffing; a better system of defining technical needs and requirement for systems to be acquired; more realistic assessments of development and acquisition schedules; movement away from parallel or concurrent development of technology and acquisition of it; and a greater reliance on a process of testing and evaluation equipment before final procurement decisions are made ("fly before you buy"). Also, some specific project program managers are organizationally more accountable to the top management of the FAA for progress or problems than before.

While these changes are widely viewed as important positive steps it is also widely viewed that the organization that is being subjected to these changes has a deeply imbedded bureaucracy that is naturally resistant to change of the type described above. The full effects of the changes in the procurement of new technology will come over time.

It is also important to note that much of these changes have to do with actions taken during development of systems prior to a procurement decision. The problems that have developed in the AAS program have come after the procurement decision but prior to actual delivery and deployment.

(For a more detailed reference on the overall air traffic modernization effort see Subcommittee hearings held on March 3, 1992, Committee Publication #102–52)

II. ADVANCED AUTOMATION SYSTEM

The Advanced Automation System will be the centerpiece of the air traffic control modernization effort. Its purpose is to replace the computer hardware, software displays that controllers use to observe and separate air traffic, and other related equipment.

The radar displays and work stations used by controllers were designed in the late 1960s and deployed in the early 1970s. The main enroute center computer, called the Host computer, is relatively modern IBM equipment. It was deployed at the enroute centers in the mid-1980s, and it will become integrated into the Advanced Automation System. The software that processes the air traffic data and converts that data into information displayed before the controllers is largely old software (early 1970s vintage) that has received numerous updates, changes, and fixes over the years and is generally viewed as a patchwork that is difficult to maintain and not easy to modify.

AAS will deliver new software and new workstations and displays that incorporate modern, contemporary computer capabilities. The mainframe IMB Host computers in place at the centers will be kept in place, but will be augmented with additional processing power and capability at the individual workstations.

The Advanced Automation System is actually a series of separate systems and other future software upgrades. (Let us provide you with a little warning at the outset. Most everyone involved with air traffic control modernization and the Advanced Automation System is extremely fluent in acronyms, abbreviations and initials that mean little to anyone else, so some of the key jargon will be referred to at this point.)

Peripheral adapter module replacement item (PAMRI)

This part of the program has been largely accomplished without problems. PAMRI is a computer that processes communications between radars and weather systems, and the enroute centers. It provides more capacity, higher reliability, and more rapid transmission of radar data into the enroute facilities than what it replaces.

Initial Sector Suite System (ISSS)

ISSS is the main part of the program and represents the new software package for the enroute centers and the new controller workstations. These will replace the round monochrome green displays with high resolution 20 inch color displays of radar data and other information. These new workstations will feature touch screen features and windows capabilities. ISSS is the aspect of the program that has encountered problems in its development and upon which most of the hearing will focus.

Terminal Advanced Automation System (TAAS)

TAAS will provide new controller workstations at terminal radar control facilities similar to that being provided at the enroute centers. This is a program that is now contemplated to follow on the heels of ISSS in the late 1990s.

Tower Control Computer Complex (TCCC)

TCCC will upgrade hardware and software at major airport control towers beginning in the late 1990s. This phase will automate much of the display and manipulation of data on aircraft that is now done manually.

Area Control Computer Complex (ACCC)

ACCC will provide new software capabilities and combine enroute and terminal radar functions into combined facilities around the turn of the century. The existing mainframe Host computer will be replaced with a new mainframe at this point. ACCC is also a late 1990s phase of the overall program.

Automated En Route Air Traffic Control (AERA)

AERA will be an even more advanced software system that will enable the computers to make recommendations and decisions on the most efficient routings and conflict resolutions for particular flights. It will also enable controllers to see potential air traffic conflicts far in advance so that the most efficient reroutings can be made.

The program, as presently envisioned, is expected to eventually cost approximately $5.1 billion, making it the largest civilian government computer purchase ever.

III. PROBLEMS IN THE AAS PROGRAM

This section will describe the history of problems in the program. It should be understood that the complexity and magnitude of what the FAA and IBM are trying to accomplish are very substantial. By all accounts, the development of AAS is an enormous computer engineering challenge. An assessment by the DOT Volpe Transportation Center describes AAS as ". . . a complex technological undertaking . . . [that] . . . from a software perspective extends the leading edge of current technology." To some extent the problems that have been encountered are a function of this complexity.

First, the system is real-time. While there are certainly larger computer data bases being processed in government and industry, these, for the most part, are relatively static. Air traffic control data, by its very nature is constantly changing, requiring a great deal of sophisticated software capabilities. IBM has approximately 500 software engineers designing and testing the new software, which when developed will involve several million lines of advanced Ada language code.

Second, because safety is paramount, reliability and performance requirements of the overall system are extremely high. Also software "bugs" that would result in inaccurate data being displayed cannot be tolerated. A requirement in much of the modernization programs is that the system be up and running, as it is supposed to, 99.99999% of the time for the next 20 years. This translates into unexpected downtime of 4 seconds per year. Most observers in this field view this level of reliability as pushing the edge of the envelope in computer reliability.

Further, the FAA expects the system to be very resilient so that the possibility of the system failing because of any single point failure is eliminated. This has necessitated a computer design or architecture that is very distributed, meaning much of the computer power is at the individual controller workstation and not totally in the central mainframe computer, as is largely the case today. Designing such a system also presents significant software engineering challenges because the distributed elements all need to know what the others are doing on a real time basis.

Third, air traffic control presents an extensive human/computer interface that raises special design and engineering issues.

Since IBM was awarded the contract to develop and deploy AAS in 1988 delays have been endemic to the program. Shortly after the contract was awarded, the competing contractor, Hughes, protested the award. While this cannot be attributed to any fault of the FAA or IBM, several months were lost while the protest was dealt with legally. Prior to the contract award, IBM and Hughes had two independent, competing design contracts from which FAA selected one, IBM. The design phase had also encountered significant delays, due to ever changing requirements by FAA, poor and inadequate testing and evaluation procedures, and poor management and oversight.

The 1988 contract spelled out specific dates and milestones for delivery of equipment for tests and evaluation and, eventually for deployment to individual en route centers and eventually terminal facilities. In mid-1989, it became apparent that the schedule laid out in the contract not be met, particularly with regard to the new controller workstation (ISSS). The 1988 contract called for ISSS to be delivered to the 21 en route centers between January 1994 and October 1995. (When the modernization effort was initiated in the early 1980s, deliveries were anticipated to take place in 1990 and 1991.) The reason the schedule could not be met was that FAA and IBM had underestimated the amount and complexity of computer software development that would be required.

In December 1990, the program was rebaselined and a new schedule was established taking account of the software development problems. That new schedule slipped deliveries by 19 months, from early to mid-1995, for the beginning of en route center delivery. The cause of this slippage was combination of continuing problems in developing the software, as well as the FAA putting additional requirements and capabilities into the system.

As mentioned before, the current estimate of the program is $5.1 billion. This represent a doubling from the 1983 cost estimate. Since the 1988 contract was entered into, the cost has grown 6% from $4.8 billion to the $5.1 billion.

Early in 1992, the program was slipped another four months to December 1995, for the first delivery, again, due to software development problems.

The following table from a September 1992 General Accounting Office Report shows how the delivery schedule has slipped for the individual elements of the AAS program.

TABLE 1: IMPLEMENTATION MILESTONES FOR AAS PHASES

AAS phase and field site	1983 schedule	1988 contract schedule	Current schedule	Delay in months 1988 to current
PAMRI:				
First	(1)	Oct. 1991	Oct. 1991	0
Last	(1)	July 1993	July 1993	0
ISSS:				
First	Late 1990	Jan. 1994	Dec. 1995	23
Last	Late 1991	Oct. 1995	Sept. 1997	23
TAAS:				
First	(1)	June 1995	Jan. 1997	19
Last	(1)	Mar. 1997	Oct. 1998	19
TCCC:				
First	(1)	June 1995	Jan. 1997	19
Last	(1)	July 1999	Dec. 2002	29
ACCC:				
First	Late 1992	July 1996	Feb. 1998	19
Last	1996	June 1998	Dec. 2002	54

[1] In 1983, the AAS project consisted of just two phases: sector suites and the full AAS. Later, the transition to AAS was divided into four phases: ISSS, TAAS, TCCC and ACCC. PAMRI was added as an initial first step. In table 1, we have used 1983 sector suite milestones for en-route centers to compare with later ISSS schedules and 1983 full-AAS milestones to compare with later ACCC schedules.

At each point that the program was slipped due to software development problems, it appears that those in the program convinced themselves (and others inside and outside of FAA and IBM) that the software problems had now been overcome, and that how to proceed in the future was clearly understood. An often used phrase by those involved in the program was: "We see no show stoppers from here on out." Events since last Fall indicate that the magnitude and complexity of the software development has not been fully appreciated, and FAA and IBM management of the program has not been adequate to the task at hand. It was also apparent that the failure to do so was not just a few remaining software "bugs" that a little more work would resolve. The problems were of a magnitude that caused major top level reviews of the entire AAS program both within IBM and the FAA, that even questioned whether the program to date should be scrapped and started over.

Beginning last September, IBM entered a crucial milestone in the program known as Formal Factory Testing. The purpose of this testing was to demonstrate that the software developed to date did what it was designed to do and met requirements and specifications for reliability and performance. By late October and early November, it became apparent that the system was not going to pass Formal Factory Testing.

In November, the FAA sent IBM a "Cure Notice" that said in part ". . . unless [IBM] can provide a plan to cure the deficiencies . . . within 10 days, the Government will withhold progress payments and may initiate default termination action," (meaning cancel the contract). In early December, IBM submitted its plan and in late December, FAA said it was insufficient. Since that time, FAA and IBM have been negotiating what an acceptable plan will be. The plan is expected to be finalized close to the time of the hearing. FAA has stated that IBM's response to date is adequate enough that it is no longer considering termination of the contract.

The major technical problems are as follows. First, the testing revealed that the software is unstable, meaning the system does not perform as expected when it is tested at peak performance. As mentioned earlier, the ISSS is a distributed computer architecture, and individual workstations have a significant amount of processing power of their own. The FAA requirement is for 210 workstations to work all at once at peak traffic load. The testing revealed that IBM has been only able to get 56 workstations working at the same time for a significant period of time. Above that point, aspects of the system crash or erroneous displays of data are made.

Another problem has been in automating the flight strip system. Flight strips are pieces of paper that contain information on altitude and destination of particular flights on which controllers make notes, such as last instructions given. A major aspect of the new controller workstation is to display this information and allow controllers to make notes about flights on the electronic displays in front of them and be rid of the paper system. IBM has had difficulty in doing this without creating a system that requires a large number of time consuming keystrokes for the controllers. This aspect of the program has also been plagued with everchanging requirements by the FAA which will be discussed later.

A third major problem has been identified as "continuous operation." Since the air traffic control system can never be shut down, there must be a back-up computer capability when the main computer goes down inadvertently or deliberately for maintenance. In the AAS program, the backup will be in the processors at the controller workstation. Since the system is real time, the back-up system ends up creating and processing a different data base than what the main computer had when it went down. IBM has had difficulty in getting the inconsistent data bases coordinated and able to work together after the overall system is returned to normal.

Another problem has been a requirement regarding the recording of air traffic control data. FAA records all air traffic control data for evaluation and incident/accident investigation. For the AAS program, FAA would like to be able to play back this data at 10 times real time. IBM has not been able to deliver this capability. Seven times real time is all they have been able to deliver at this point.

Beyond the specifics of the technical difficulties, FAA and IBM have come to the conclusion that lack of resolution of these technical problems over time has been largely the result of management deficiencies at both the agency and the contractor.

With respect to the FAA, the principal problem has been that the agency has continued to add or change requirements for the system in an undisciplined manner, with little regard for how the changes would affect cost and schedule of the program. As an example, the FAA, after seeing a particular approach for displaying certain types of data would decide to change the color of the display or put in a different location. Such changes usually added time and cost to the program. There have been scores of requirement changes in the program.

In a similar vein, the FAA has not been timely in resolving issues associated with changes in its requirements. The AAS program has wanted to have its "customer" organization within FAA, the Air Traffic Service, have a strong say-so in how the requirements are defined. While such input by the customer or user is certainly beneficial in the long run, the process of making firm, timely decisions based on this input has been undisciplined, and some issues have dragged on, undecided for too long. Moreover, discussions between FAA and the Committee staff indicate that the FAA has been ill-equipped organizationally to make decisions in this area, because the persons charged with making the decisions within the Air Traffic Service have not been of high enough position or authority to make the decision stick within their organization.

Last Spring, the DOT's Volpe Transportation Center undertook an assessment of the technical risk associated with the AAS software development. This assessment made a number of recommendations based on flaws found in FAA's management of the software development. Among these were: Strengthen the "customer" organizations' role within the AAS program; Bring in more software management specialists into the FAA so that the agency can deal with software development issues in a more timely and informed fashion; Strengthen FAA oversight and management of the IBM contract by ensuring that schedule and test development is done with proactive, not reactive, participation by FAA managers.

While FAA's plan has not finalized as of this writing, it appears that FAA plans to take steps to correct these identified management deficiencies and to stabilize the requirements changes.

IBM's shortcomings in AAS development have been largely identified in its software testing organizations not following standardized testing regimens. Testing milestones were skipped or shortcutted and new software was developed assuming that the previously developed software had been tested and performed. When it was discovered that the testing of the earlier software did not function as prescribed, the subsequently developed software would also have to be presumed as flawed.

Also, beyond key instances of software not being tested, IBM's software testing was done by a number of diverse organizations within IBM. This created confusion and inefficiency because when tests were performed, they would sometimes have to be redone because one organization was not satisfied by the other organization's test or the focus for the tests. Different organizations were trying to resolve different issues at the same milestone. As with FAA, it appears that IBM has taken initial steps to correct this, including a complete change of the management of the AAS program within IBM.

Aside from the specific management issues in this program that the FAA and IBM are now seeking to address, it appears that management of this program at the highest levels of FAA and IBM has been inadequate. This is indicated by the surprise of high level FAA policy makers and company executives at the magnitude of the problems and their implications for successful completion of the program when they surfaced last Fall. This surprise indicates that the AAS program has been largely a "black box" within the FAA and IBM organizations, basically running itself without much clear understanding of what has really been going on inside the box by those on the outside.

IV. CONSOLIDATION OF RADAR FACILITIES

Aside from the technical development of AAS, FAA will be making a decision in the near future about how many radar facilities it will need when the next generation of automation is deployed. At the outset of the modernization, the FAA planned that the 21 enroute centers and the 225 terminal radar facilities would be consolidated into 23 large Area Control Facilities which would have combined enroute and terminal functions for wide geographic areas. Much of the latter phases of the Advanced Automation System's program's design is based on a greatly consolidated system.

Originally FAA looked to consolidation as a major means of savings overhead and personnel costs for the agency. Consolidation is now being rethought, and it appears that the agency will soon largely abandon its earlier thinking on consolidation.

The reason for this is that reducing to 23 Area Control Facilities is now believed to pose too much risk in that such a facility's failure would be extremely disruptive to the aviation system. Also, the cost savings originally identified from consolidation are now estimated to be very little. Since the original plan, the cost of moving federal employees has escalated cutting significantly into any cost savings derived from consolidation. Further, and maybe most importantly, was a concern that Congress would not likely support a major consolidation given Congress' interest in keeping Flight Service Station facilities open during the 1980's as they were consolidated. The Flight Service Stations that have been closed are far smaller in terms of personnel than the terminal radar facilities that would be closed presumably.

At this point the expectation is that FAA will likely keep the enroute centers functioning as they are today; consolidate some terminal facilities in large metropolitan areas that have multiple terminals; and leave approximately 175 terminal radar facilities functioning as they do today. No final decisions have been made or announced.

Since some of the future aspects of AAS beyond the enroute controller workstation segment (ISSS) is predicted on a highly consolidated system, FAA may well have to re-think their approach to these future aspects if consolidation ends up relatively limited.

V. ANTICIPATED WITNESSES

Representatives from the following organizations are expected to present testimony: Federal Aviation Administration, International Business Machines, General Accounting Office, Air Transport Association, National Aviation Associations Coalitions, National Air Traffic Controllers Association, and Professional Airways System Specialists.

DELAYS, TECHNICAL PROBLEMS, AND COST ESCALATION IN FEDERAL AVIATION ADMINISTRATION'S ADVANCED AUTOMATION SYSTEM PROGRAM

WEDNESDAY, MARCH 10, 1993

House of Representatives,
Subcommittee on Aviation,
Committee on Public Works and Transportation,
Washington, DC

The subcommittee met, pursuant to call, at 10:00 a.m., in room 2167, Rayburn House Office Building, Hon. James L. Oberstar (chairman of the subcommittee) presiding.

Mr. Oberstar. Subcommittee on Aviation will come to order.

First, there are a number of conflicts, a number of other committee meetings and internal committee activities as we prepare for our budget process, known as the "committee funding resolution process."

A number of Members are detained at other activities and current hearings as we get into the very bits and parts of our legislative programs. Other Members will be coming, including Mr. Clinger who has an unavoidable committee conflict, where he is the Ranking Member on another full committee, and should be here this morning.

Further, the Chair would like to announce that we will go until 12:30 this morning in an attempt to get through at least the first two panels by that time. And then we will resume at 1:30.

Today, the Subcommittee on Aviation resumes its inquiry into delays, technical problems and cost escalations in the Federal Aviation Administration's advanced automation system program. This initiative is the centerpiece of an effort begun years ago to modernize the technology of the Nation's air traffic control system.

It is a program that is in serious trouble, so serious that the Congress, the aviation community, the traveling public, have come perilously close to losing confidence in the organizations that carry the responsibility of implementing this program, the FAA and IBM.

The advanced automation system is a $5 billion program, part of what has now become a $31 or $32 billion modernization program for the entire FAA system of air navigation. The AAS is to provide a highly automated network of work stations used by air traffic controllers, together with modern, new software to process the flow of air traffic control data. This contract and this system and this initiative represent the largest and one of the most complex automation systems ever purchased by the Federal Government.

The FAA has embarked on a extraordinarily ambitious program with extremely high standards of reliability and functionality. For all practical purposes, the FAA expects that when the modern, new AAS system is turned on, it will stay on for the next 20 years without going down for a collective total of one minute in 20 years.

The computer architecture is very "distributed," to use the technical term, which means that each work station operates independently, but is interconnected in a way that mainframes are now connected, so that when and if it is up and running, the system will be very resilient. It will be very flexible and can easily be upgraded.

To institute such a system is extraordinarily complex. To have a network, you can imagine each one of these seats being an individual work station, each one of them with the total capability that it requires, and yet to be interconnected so that each of the other stations knows what the other one is doing. It is very, very complex, more complex than all but programs the Apollo mission used to land on the moon, but its more significant than Apollo and more significant than anything else we do in the space program, because space is a question of maybe six people in outer space at any one time.

The air traffic control system affects half a billion people flying a year—far more important to the Nation's economy than the space program. It requires also millions of lines of sophisticated advanced computer code that has to be perfect, because a small bug in the software could display an aircraft or show it where it is not and thereby threaten the safety of its passengers.

To say the challenge to produce such a system is formidable would be an understatement. It is a massive challenge, an extraordinary undertaking.

And I want to say that the system we have today in the United States is at least a generation, if not more, ahead of anything that operates in the European air traffic control system. Europe has one-fourth the air space of the United States, twice as many air traffic control centers and less traffic than we have in the United States, more complexity in moving aircraft and people from point to point.

But this challenge is one that the FAA launched and IBM accepted, and both of them have accepted the challenge.

It is also a challenge that the traveling public and the Congress have provided billions of dollars to undertake and have done so in a climate that is not very conducive to large outlays of new dollars.

I cite the magnitude of the task, but that magnitude, in itself should not be an excuse for failure, an excuse for not achieving the goal. Since the early 1980s when the FAA and its contractors embarked on an air traffic control modernization program there has been ample opportunity and experience to understand and learn how to manage large systems of this type.

This is not the new—the first or the only. There have been other complex systems that the FAA has had to manage and that its contractor IBM has managed. Nobody expects programs of this complexity to be problem-free. There would be a learning curve, notwithstanding the previous experiences. But it is the nature of this business to run into difficulties and to experience changed circumstances in programs of this kind.

The problems of the AAS are of a type and magnitude we have not seen before, but they are also of a nature that we have not seen the lessons learned approach of both FAA and IBM.

I would cite the Host computer system, the system that everyone agrees is working well, that missed its starting target by six months. That is not bad considering how big a system it was and the complexity of installing it, without losing a beat in air traffic control, without having to shut down the air traffic control system. It was an exceptional achievement. But in the process, that system went from 80,000 lines of computer code to 130,000 lines of computer codes, a 62 percent increase. And at one point it had 265 open items in the contract that ultimately had to be closed out, and they were one of the reasons for the delay.

But both IBM and FAA achieved that goal and met the target and got the system up and running, and I thought that both would have learned from that experience.

This is a system that is 10 times more complex. Not 130,000 lines of computer code, but well over 1.1 million or 1.2 million lines in the computer code. Both knew that the challenge was of a very different nature. And the problems in this program, of course, are technical software that doesn't perform as it is supposed to, the reliability standard that can be achieved, complex integration of systems that isn't happening.

But the broader and more important problem has been management deficiencies. The managers on both sides have run the program with an overly optimistic outlook and with a faith that problems just resolved would be the last problems to be encountered. What they needed was a very healthy skepticism toward engineers' proposed schedules and faith in their own; that is, their own engineers' abilities to solve problems.

This program needs a much more disciplined approach to defining exactly what is needed. FAA and IBM have been building a house in which the rooms continue to be expanded and reconfigured and the ceilings raised and the wallboard torn down and replaced and the wallpaper ripped off; and this constant redesign of the system has got to stop. Someone has got to draw a line, understand that this is our target. We are going to meet this system and going to stay with it and reach a successful completion.

On the IBM side, contractors have not delivered what the Government has been paying for. Contractors have skipped or short-circuited key testing regimens, and that practice, in and of itself, has caused delays. The program has not received adequate management from FAA's top leadership, which has had a nasty habit of changing every two years. It's not the fault of the professionals at FAA. It is just that you can't keep people in the top, and somebody needs to nail their shoes down in place and say, "stay."

When IBM couldn't pass the crucial testing milestone last fall then-Administrator Tom Richards told me candidly, it has taken me a year to understand this program. Now I understand it. Now I have to do something, and this is what I am going to do; and then he was gone in two months.

The fact that he was shocked, shocked me. And similarly, IBM officials were surprised at what they discovered when they began looking into the program after they found testing failures.

What all of this adds up to is that the program itself got away from the very organizations and people within those organizations who were supposed to be making sure that things happened the way they were intended to happen. That is not the way to run a project costing $5 billion. You have got to do better than the Defense Department. It is not the way to prepare for the 21st Century.

Now, since the failures of last fall and the cure order issued by FAA to IBM, I think both agencies have come to recognize the deficiencies and are taking firm and decisive steps to get the program back on track. And that is the purpose of the hearing today, to see where we are, where we are headed, develop if we can some confidence that the management decisions have been made, the structures are in place, the people have been changed, the right attitude is there, and this program is going to achieve a goal that is set and will not become a moving target.

I hope we are going to hear about new management structures, decision-making processes, that will be improvements. And I must say I have been impressed with what I have heard about the new attitude on both sides. Both have stopped pointing fingers at each other instead of pointing fingers at the problem, and that is the first step toward credibility. Nonetheless, both IBM and FAA have their work cut out for them.

Credibility will not be established by what they say, although that will be important; it will be established by what they do by demonstrating week in and week out discipline and adherence to a new schedule that both parties have established.

Certainly, by what I see in my discussions with Administrator Del Balzo and Mr. Ebker at IBM there is a realization that they are at the bottom of the barrel and the only way out is to start climbing out together. But I will remain skeptical and I will remain vigilant over this program.

We are going to have a monthly review of what they are doing, month by month, just as they are going to be doing it for themselves. Failure to point has created a very serious problem. I say to both the FAA and IBM, that failure has created a breeding ground for some half-baked ideas that keep coming up from time to time, one of which is scrap the whole thing and start over again. That is wrong.

The problem is that there were failures on both sides, and a big part of that failure was on the private sector side. But this is a joint industry-government effort in which the Government should clearly be in the lead as a protector of the public interest, and the FAA let the public down. And IBM let the FAA down, and both of them have let the Congress down.

No more masquerades, no more charades. Total honesty with this committee and Congress and with the traveling public about what you can and can't do. Set targets, choose them, and go forward.

We look forward to the testimony that will be coming this morning. I look forward to Mr. Clinger's statement.

Mr. CLINGER. Thank you very much, Mr. Chairman. And first of all, I just want to applaud you for calling this hearing. I think it is a hearing that I look forward to with great anticipation, because as you have indicated, it is a long-festering problem and one that I think deserves to have the spotlight of attention focused on it today.

This has really been a trouble-plagued system, and the hearing probably comes too late to salvage the timely delivery of what was to have been and, hopefully, will still be the preeminent air traffic control system in the world. What we are engaging in today is nothing more than a retrospective of mistakes and mismanagement, perhaps a degree of cover-up, and what we will be seeking is nothing less than ironclad assurances that these delays will not continue, as you have indicated, Mr. Chairman.

Congress has endeavored to facilitate air travel in this country by providing funding for the design and construction of a modern network of computers, radars, and communications systems to safely and efficiently guide aircraft throughout our Nation's airways system. Yet we still appear to be at least three years away from fielding what is billed to be a vastly improved system, a model for the rest of the world.

But, frankly, what I find so disturbing is, unlike other Federal departments and agencies, the FAA plays a very unique role managing and influencing the day-to-day affairs of a very large and competitive transportation industry. Yet they are unable to live up to this mandate so far as planning for the future. In this instance, there has clearly been a failure.

The FAA directly influences the fortunes of companies and the convenience of hundreds of thousands of travelers each and every day of the year, and when they don't do their job, clearly the industry will suffer. Congress relied on the resident expertise of the FAA to use their best engineering and management judgment to lay down design specifications for a system that was expected to be both practical and affordable. We also relied on FAA to establish guidelines and timelines for testing and delivery; and I might say, in spite of a Federal program of as immense value as AAS, Congress, for once I think, cannot be accused of interfering or micromanaging this acquisition. If anything, we perhaps have been too laid back in monitoring what has gone on for the last few years.

I do think FAA has been particularly irresponsible to constantly change system requirements throughout this acquisition. It is reasonable to assume that some change might be necessary as the project goes forward, but it is my understanding, at least, that FAA issued one modification after another, making it virtually impossible for any contractor, no matter how competent, to stay on schedule. That was a constantly moving target—very, very difficult to pin down; very, very difficult to set an end to the process. And I understand how that happened, because of the effort made to make sure that this system was going to be user friendly, that the controllers themselves were going to be able to work with it. Therefore, they have been involved in the modifications that have gone on.

During today's hearing, I am not so much interested to assess blame. Certainly, there is plenty of that to go around. Rather, before we conclude this afternoon, I want to be assured beyond any reasonable doubt that developmental problems have been identified, that sufficient management and resources are being mustered to work out solutions, and that realistic goals have been set and can be met.

If we are sitting here 18 months from now going through this exercise again, I can assure the FAA and IBM that it won't be a pleasant experience.

So, Mr. Chairman, I look forward to the witnesses today. I do note that we have some questions to address to the Department of Transportation. I hope that we can get those questions answered. I am not sure why we do not have a witness from DOT, but I know that there are some questions we would like to address to them as well.

Thank you very much, Mr. Chairman.

Mr. OBERSTAR. Yes. We should have a DOT witness, but it is hard to find one. As we all know they haven't been appointed yet.

If necessary, we will convene another hearing to take testimony from an administrative level at DOT.

Are there other Members who wish to make opening comments or observations?

Mr. Shuster?

Mr. SHUSTER. Thank you, Mr. Chairman. I will simply say that I guess I have sort of a unique situation here, having spent 17 years of my life in the electronic computer industry, designing and installing marketing computer systems. In fact, I was involved—it seems like 100 years ago—in the installation of one of the first air traffic controller systems in Pittsburgh, Pennsylvania—UNIVAC file computer—and I have scars on my back from the kinds of problems the vendor faces in this kind of a situation.

Usually when these problems occur, number one, the system has been oversold by the vendor; or number two, the hardware and the software don't work the way they are supposed to; or number three, the user has changed the specs. And I sense that this has been a moving target. At least one of the problems may well have been that the FAA kept changing the specifications, the requirements, making it virtually impossible for IBM to meet those changing requirements in a timely fashion.

So I am very much interested in seeing and hearing how these problems are going to be solved and, indeed, seeing to it that it doesn't happen in the future. Thank you very much.

Mr. OBERSTAR. Thank you.

Mr. Ewing?

Mr. EWING. Thank you, Mr. Chairman, and I want to congratulate you on calling this hearing. I do hope that we will obtain some very interesting answers from both the Federal Aviation Administration and IBM.

I just wanted to make one personal point here, that I have some other concerns about airport improvement programs that I would like to have raised today. While I understand that is not the subject of this hearing and will be the subject of a later hearing, I look forward to that. And I will be providing to the Acting Director of the Federal Aviation Administration, some material today; and I hope that he will respond to me very quickly on my questions so that we will be ready for those hearings when we have them later this month.

Thank you.

Mr. OBERSTAR. Thank you. I would like to insert into the record at this point prepared statements received from Representatives Blackwell, Costello and McKeon.

[Statements referred to follow:]

STATEMENT OF CONGRESSMAN LUCIEN E. BLACKWELL

Thank you, Mr. Chairman. I want to commend you for conducting this hearing. It reflects your proper recognition of a festering problem which will not go away and the need for Congress and the Executive Branch not only to identify the underlying causes for the current difficulties with the Advanced Automation System, but also to fashion appropriate solutions that will assist the Federal Aviation Administration in its efforts to upgrade and modernize air traffic control. Therefore, it is a sincere pleasure to join you and my Colleagues for what I expect will be an informative hearing today.

I am most anxious to learn more about the problems of delays, cost escalations and technical difficulties confronting the air traffic control system and its complex innerworkings of radars, computers, weather detection systems, navigation beacons, control towers, en route centers and people.

We are here today to discuss the potential causes for these difficulties and to examine some possible solutions for improving them. I know that we will hear today many suggestions offering inventive resolutions for settling what has become a much discussed issue. At the same time, though, we must remember to make every effort to take a reasoned and careful approach as we consider the issues before us today.

What's more, we must, in any event, consider most favorably any measure which emphasizes as paramount the maintenance of safety.

Indeed, we must also be sure that any program or concept we enact to improve the air traffic control system offers a heightened awareness of reliability and performance requirements.

I have no doubt that we are capable of making a fair determination of what steps can and should be taken to allow the Federal Aviation Administration to reach its full potential in overcoming the many obstacles currently plaguing the development of its automation. This subcommittee will play an important role in making that determination, and I thank you for your leadership, Mr. Chairman, in that process.

I welcome the witnesses who will appear before us today and await their testimony.

Thank you, Mr. Chairman.

STATEMENT OF JERRY F. COSTELLO

Mr. Chairman, I would like to thank you for calling the hearing today to disucss and analyze the delays and other problems with the FAA's Advanced Automation System. I believe it is important that we, as a Subcommittee, look at what caused these problems to occur and study what has been done to remedy these problems.

I would like to welcome the panelists who have assembled to discuss this issue. I look forward to hearing your testimony and learning about the technical problems facing the system. In addition, it is important that the Subcommittee is reassured that these problems will not continue and that the system can be completed and in place in Seattle by the new completion date. Again, Mr. Chairman, thank you for calling today's hearing.

STATEMENT OF HON. HOWARD "BUCK" MCKEON

Thank you, Mr. Chairman. The difficulties in implementing advanced automation system technology are of great concern to me and many of my constituents who fly into and out of Los Angeles International Airport. The problem has been twofold. First, the FAA did not adequately consider the complexities involved in modernizing our Nation's air traffic control system, and second, contractors were overly optimistic when agreeing to deadlines mandated by their agreements with the FAA. I understand that this Subcommittee has dealt with this issue in the past, and among the results of those hearings was the need to inject more realism into the contracting process, particularly with regard to development and acquisition schedules. What penalties, if any, this Subcommittee recommends remains to be seen. It is my sincere hope that a meaningful solution will be developed so that a similar situation does not occur in the near future.

Mr. OBERSTAR. Mr. Joseph Del Balzo, Acting Administrator, FAA; and Mr. Gerald W. Ebker, Chairman and CEO, Federal Systems, for IBM.

TESTIMONY OF JOSEPH M. DEL BALZO, ACTING ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION; AND GERALD W. EBKER, CHAIRMAN AND CEO, FEDERAL SYSTEMS CO., INTERNATIONAL BUSINESS MACHINES CORP.

Mr. OBERSTAR. Mr. Del Balzo, welcome. We are glad to see you this morning. Mr. Ebker, we are glad to have you.

You have separate statements, and we will take your statement at this time, Mr. Del Balzo.

Mr. DEL BALZO. Mr. Chairman, thank you. It goes without saying that I am pleased to appear before you today to talk about the status of FAA's Advanced Automation System program, or AAS. I have a statement which I would like to insert for the record and I would like to make some brief comments.

Mr. OBERSTAR. The complete statement will be included in the record, without objection.

Mr. DEL BALZO. Mr. Chairman, I think, as you and the Subcommittee know, the advanced automation program is the heart and soul of our Capital Investment Plan. It is the key that will open the door to real gains in air traffic control system capacity, efficiency and productivity. And it is true there are serious problems in the program.

We have encountered severe schedule delays, troubling overruns. Moreover, the management of the program by the FAA, the performance of IBM, as you point out, has been criticized by our independent auditors, by GAO, by the Congress. And it is also of concern to Secretary Peña.

I am not here this morning to gloss over the very real problems. I am not here to be defensive, nor to engage in a whitewash of those problems. What I would like to do this morning is share with you our honest assessment of the issues, the problems, and what we have done to address them.

Let me first begin by briefly talking about what AAS is. AAS is a key element of FAA's Capital Investment Plan; it represents a variety of efforts to modernize the air traffic control system. And I think, Mr. Chairman, you and the Subcommittee know how important it is that we completely modernize the air traffic control system infrastructure in the United States. AAS is the cornerstone of this current modernization effort.

Let me tell you what the objectives of AAS are. Number one, it is to replace aging equipment. The air traffic control automation system in use today was designed under President Kennedy and was developed under President Johnson, and it was implemented under President Nixon.

There is a terminal automation system in place at National Airport. It is an ARTS III–A. That terminal automation system guided your last landing at National Airport, and it is 20 years older than the equivalent system in Moscow in the now defunct USSR. Aging equipment has to be replaced, and we have to find a way to replace it quickly.

The second objective is to reduce the other growing costs of operating the air traffic control system.

The third objective is to provide for increases in safety, productivity, and acknowledged benefits to the users of the air space today.

And finally, the last objective is to meet the demands for increased safety, productivity, and user benefits well into the 21st Century.

The AAS contract was awarded in 1988, and at that time, it was the largest automation contract ever awarded in the civil sector. AAS will provide the capacity to handle the projected air traffic load well into the 21st Century. It offers us increased productivity, safety benefits, and increased reliability.

AAS is not one system; it is a series of five systems. System one is what we call a Peripheral Adapter Module Replace Item. It is called PAMRI for short, and it simply replaces aging hardware in 20 air traffic control centers, hardware that interfaces with radar and communications systems. It was implemented successfully on or ahead of the original contract schedule.

The second part is a controller work station. It is an Initial Sector Suite System, and we refer to it as ISSS. That system replaces hardware that has been in use since 1970, displays that have been in place since 1960 and flight strip printers in our center that are simply archaic.

The third part of the program is a Terminal Advanced Automation System. We refer to that system this morning as TAAS, and that system replaces the existing equipment, such as the equipment you landed on at National Airport, with new common consoles and a new computer architecture.

The fourth part of the program is a Tower Control Computer Complex. We refer to that part as TCCC. It is a program that is designed to replace existing equipment in all of our air traffic control towers throughout the country with new tower control work stations and automation equipment.

And finally the fifth part of the program is what we call an Area Computer Control Complex. We will refer to that as ACCC. That is a system that is designed to reengineer the existing 1960's vintage en-route software, and put that new software on a commercial processor.

When those five parts of the program are completed, we and our air traffic control system computers will be performing many of the existing controller functions much more efficiently, much more precisely, in a way that will free up controllers to perform functions that people can do better. For example, when the system is complete, we will be able to evaluate radar data to combine aircraft locations, altitudes, and velocities, along with wind speed predictions. We will be able to look ahead as much as 20 minutes into the future of a flight. We will able to scan for potential conflicts with other aircraft.

We will be highlighting in bright red the potential collision course on a controller's display. The system will then rank potential course corrections for the controller, who will decide what action to take. This will help tremendously in assigning aircraft more direct and fuel-efficient routes, saving time and money.

When I look at the program, I will tell you that our success has been mixed. We began our automation efforts by changing our original en-route computer in our air traffic control centers. That was the Host computer that the Chairman talked about in his opening remarks. That program was a success, and it was done essentially on time.

Part one of the AAS program, that I referred to as PAMRI, is also a real success story, with the last system to be implemented this April, ahead of schedule. Our user teams, in the creation of the Development Demonstration Facility that several Members of this Subcommittee had a chance to visit, have been invaluable in helping to ensure that when we build the product and field it, it will be acceptable to the users.

But we have experienced problems, most significantly, with the ISSS segment. I will talk about them. The problem is a simple one. It is taking too long to develop and too long to implement.

About two years ago FAA and IBM changed our original contract, and FAA accepted at that time a 19-month delay. Five months of that delay was due to FAA changes in requirements—we plead guilty—and the remaining 14 months resulted from software development difficulties encountered by IBM.

This past November, IBM advised us that it would experience an additional 14-month slippage in the program due to significant software development problems. As the Chairman pointed out, following that notice, we acted promptly to insist upon a proposed plan from IBM to cure the problem, to set course corrections and firm up a schedule.

IBM responded with an initial proposed Cure Plan. A senior-level FAA team was appointed to work directly with IBM officials to see that the plan was strengthened to meet our requirements. IBM has recently provided us with this plan, which is now under technical review within the FAA.

On a separate track, IBM has already taken a number of positive actions that Mr. Ebker will talk about, which respond to the problems encountered with the ISSS program. They now have a much strengthened management focus on this planning, along with a greater resource commitment.

IBM has also strengthened its internal order of ISSS, as well as testing procedure. FAA has taken action and several major steps to change the way we have done business on the AAS program.

Our review of the problems encountered with the program indicates to us that we did not exercise sufficient continuing top-management focus on the program. We generally took far too long to respond to technical issues or problems raised by IBM, and we were not providing adequate top-level attention to requirements changes in the program. We plead guilty to all of that.

The recent changes we have instituted address all of these issues. Let me tell you what we have done.

We have restructured our management of the AAS program to provide program support and oversight at the top. The Program Director of the overall program now reports directly to the Administrator.

The Program Director is empowered to make decisions on issues affecting requirements, except where schedule or cost of the program will be affected. We will not allow another requirements change to dictate schedule or cost growth. That authority is reserved to the Administrator only for those requirements that are critical safety enhancements.

The Program Director will be accountable for cost containment and keeping the program on schedule. The FAA's Acquisition Review Council, chaired by the Administrator, will review the status of the program at least every two weeks, more often if necessary.

We have also established separate program managers for the different parts of the AAS Program. We have already selected the program manager for ISSS. Several program managers will report directly to the AAS program director, who has the overall responsibility.

The FAA has also now established a dedicated ISSS program team on-site at IBM. The team includes representatives from our air traffic and airway facilities organizations, our internal customers, and a contracting officer who has delegated authority to make real time decisions every day with our industrial partner, IBM. This team is fully empowered to resolve issues as they arise, eliminating the decision-making delays of the past where it simply took too long for us to come to grips with technical problems. We have worked our way through nearly 100 open items in the last several weeks, leaving us with just two major technical issues on the table.

Another key step we have taken is to fix the requirements for ISSS. We need to make sure our controllers have everything they need under this program, and we will. We also need to provide a steadier target for IBM to work toward. We need to separate the "nice to haves" from the "need to haves." We are doing just that. To this end, we have established an operational suitability action team.

We plan to freeze requirements for the ISSS by the 1st of April. I would suggest that this freezing of requirements does not mean that there will be no additional changes to the system. I wouldn't be candid if I said there would be no additional changes to the system. There will be; there have to be. Based on prior experience, I am just convinced that operational testing of ISSS will highlight some aspects of the system that need tweaking or changing before full-scale deployment can begin. It happened to us on the Host computer and it will happen again on this program.

The difference is, we are committed to maintaining control over any requirements changes, and I would add that there may be requirements which we believe are needed, but can be deferred until after an operational system is fielded. In those cases, sticking to the schedule will take top priority. Schedule and cost containment will be much greater drivers of the program than ever before. I assure you today that we are committed to fielding an operational system in Seattle in October of 1996, and we will do all that we can to meet that time frame.

So far, I have talked about what we have done to address problems with the ISSS segment of the AAS. Let me briefly touch on the status of the rest of the AAS program. As I mentioned earlier, the terminal AAS or TAAS will introduce new equipment and software into the terminal operational environment. The latest milestone demonstration was successfully concluded this February. The program is on track; we see no major issues before us. However, delivery of TAAS will be delayed by seven months due to the ISSS delay.

The fourth part of the program, the Tower Control Computer Complex, TCCC, and the fourth, the Area Computer Control Complex, the ACCC, are unaffected by the ISSS slippage. Funding restrictions have decreased activities in these two programs, and we are now reviewing the impact of these restrictions on program schedules.

You will hear a lot about a function called AERA, A–E–R–A; it is this function that ultimately provides all the benefits to the users of airspace that this program was originally designed to provide. It allows us to provide more direct routing, savings in fuel, savings in time. We can't wait until a new computer is developed and new software is developed to introduce this capability to the user community.

So we are doing everything we can to ensure that we can bring on an equivalent system as functional as we can so that when ISSS is ready, AERA will be ready at the same time. I think we are capable of doing that, and that we will be successful.

In closing, Mr. Chairman and Members of the Subcommittee, I would like to emphasize the importance we place on the AAS program, and we agree with you on the need for its timely completion. AAS is an investment in our air transportation infrastructure that is needed to take the aviation industry into the 21st Century. We regret the recent slippage we have encountered in the program. I believe the steps we have taken reflect our commitment at the top to provide an improved foundation for managing the program in a way that will keep it on budget and on schedule. You have my personal assurance that we will not relent in these efforts.

Mr. Chairman, that completes my statement. I would be pleased to respond to questions now or after Mr. Ebker.

Mr. OBERSTAR. We will take Mr. Ebker's statement and thank you for a very candid report and for a frank assessment of FAA's own shortcomings in this program. It is refreshing to have that kind of candor in a matter of such significance as this.

Mr. Ebker, welcome to the committee. I believe this is your first appearance before us.

Mr. EBKER. Yes, it is.

Mr. OBERSTAR. Let's hope it is your last.

Mr. EBKER. I will do my best to make it that way.

I have submitted written testimony and will make just a few brief comments.

Mr. OBERSTAR. No objection. Your complete statement will be in the record. You may summarize as you wish.

Mr. EBKER. Some years ago, the FAA wrote the initial system level specification of the FAA system. It was an 865-page document, and really was the basis for the IBM contract. Naturally, it was a very high-level description of the system, and it was necessary to then go in and do a great deal of engineering analysis, to do various trade studies of various engineering alternatives, and in some cases, even hardware prototypes, to be able to take that high-level description and take it down to another level of detail.

The FAA, assisted very ably by the engineering staffs of MITRE, Martin Marietta, TRW, and IBM, after performing those engineering analyses, then generated the segment specification, which is some 3,400 pages of specification.

But even that was too general to begin development on a system of this size and magnitude, and so another level of engineering analysis was undertaken, much more prototyping was done. And one of the facilities that was used for this prototyping was the Development and Demonstration Facility, the DDF, that many of you had the opportunity to visit some days past.

That facility was brought on line and controllers are allowed to work with the system to develop feedback that then could go into and assist in the specification for the final system. This resulted in the final development requirements for the system.

These three levels are requirements. The system, subsystem, and the final level requirements, combined, really compose the technical baseline of the AAS system.

Now, if those were here in this room today, they would compose a pile of requirements that would be 20 feet tall and weigh some 600 pounds.

Now, some years ago I had the opportunity to work on the Apollo program, which some have characterized as the most outstanding engineering achievement of the 20th Century. I have heard Chris Craft say repeatedly that the Apollo program was made possible by the modern computer. Having worked on that Apollo computer program for nearly 10 years, let me assure you it was nowhere near the size or complexity of the system that we are building with the FAA.

Now, I want to say that despite the complexity of the AAS program and despite the good amount and creativity of work that has already been accomplished, I would be the first to admit that we, IBM, have not done as well as we should have. Even as Joe has described the number of changes that are being made within the FAA, I will discuss some that we are making within IBM as well.

As you are aware, I am relinquishing my role as CEO of the Federal Systems Company, and I am and will be running this program for IBM. We have taken the AAS program and we have projectized the two near-term segments, ISSS and TAAS; and whereas the functional organization has strengths in communications and in sharing the resources, there is no question but that with a single-minded focus on delivery of a system, the project organization works best, and that is where we are.

We have jointly instituted with the FAA a much more rigorous tracking and reporting process. Where before the project was reviewed on a monthly basis then, and all segments in a four-hour period, we are currently reviewing each, ISSS and TAAS, in a dedicated session. We have what we call "war rooms" established, with all the pertinent information, and on a weekly basis project management of ISSS and the FAA–ISSS management review in great detail anywhere from four to six hours at a clip each week to review the status, to really agree on the priorities, the issues, and the action plans that need to be developed.

In addition, we have done a number of things to underwrite the position we currently have.

For example, we did a complete engineering audit of all of the requirements, all 20 feet, to really determine the exact technical baseline for the program. We have then performed an exhaustive audit of all code developed to date against those requirements to make sure that we were on the right track.

We have performed audits of our configuration management system and also the common code system, which is one of the most critical elements of the overall design.

Now, having recognized the difficulties and some of the changes that we have instituted, and certainly expressing dismay over our inability to achieve the plan scheduled, I nevertheless can assure you that the system objectives have not been moved, the system integrity has not been compromised.

The system, when it is delivered, will contain the very latest in system architecture, local area network connectivity, distributed processing and open systems. It will allow new functions to be programmed in stand-alone processors that can easily be connected to a local area network. It will allow new technology to replace old technology quickly and easily. The processors are based on RISC technology, which is the fastest-growing segment of the information processing industry and doubling in performance every 18 months.

And the system will be virtually nonstop, eliminating the ultimate worry of every controller, which is controlling traffic without computers and displays.

Mr. Chairman, I know the American flying public are eagerly waiting for the benefits of this system, and you have our commitment to do everything humanly possible to speed that day.

Thank you.

Mr. OBERSTAR. Thank you, Mr. Ebker.

The committee will proceed under the five-minute rule and strictly adhere to it so that Members can have more than one round of questioning and give everybody an opportunity to raise, in some depth, the points that they wish to raise.

How much time should the Administrator of the FAA spend overseeing the progress on this contract, Mr. Del Balzo?

Mr. DEL BALZO. I think it varies. I think the amount of time and attention that will be required on the Administrator's part will be directly dependent upon the nature of the problems and the decisions that have to be made.

I tell you what we are planning on now. We are planning on a minimum of a half-day every two weeks. We are planning also on real-time evaluation of progress against a set of closely-spaced milestones that we will have computer access to.

We have ensured that the program manager knows that he has the authority to call emergency meetings of the Acquisition Review Council when a decision is required. So I would say my answer to your question on this particular program is, a lot.

Mr. OBERSTAR. You are straight-lining now the organizational structure so that the program manager for this system will report directly to the Administrator?

Mr. DEL BALZO. Yes, sir.

Mr. OBERSTAR. Does that mean that when there is some glitch that this person can call you directly and say, we have a problem, we need a policy decision, we need to talk to you about it; and they get in to you right then?

Mr. DEL BALZO. Yes. He has direct access to the Administrator. What we have done is make him an FAA program manager. When he speaks, he speaks for the Administrator. He's not an engineering program manager or an operational program manager; he is an FAA program manager, which is a critical difference in the way we have ever done business in the past.

Mr. OBERSTAR. And the review every two weeks, that would be some sort of formal review, a progress, top to bottom, in the system?

Mr. DEL BALZO. Yes, sir, top to bottom every two weeks.

Mr. OBERSTAR. Or as often as needed, and on the spot if problems arise?

Mr. DEL BALZO. Yes.

Mr. OBERSTAR. Mr. Ebker, how much time are you going to be spending? I think last week when we visited the demonstration center, you were talking in terms of three days a week. Your statement this morning indicates more than that.

Mr. EBKER. Well, let me go back in history, first of all, and say that if I did it on a quantitative basis, this program represents about 10 percent of my revenues, so I should spend perhaps 10 percent of my time; and I think I was previously, but frankly it wasn't enough.

I made a commitment to Joe and the agency back in the December time frame that I would spend three days a week on that program and, quite frankly, quickly found out that this was not a doable program even on three-day-a-week basis. I am currently spending well over 40 hours a week on it, and I do not expect that to change in the foreseeable future. Hopefully, it will not require much more than what is possible.

Mr. OBERSTAR. Given the significance and the magnitude of this program and its importance to air traffic and the traveling public, that amount of time is warranted, at least that much time by the program manager for FAA and probably more often on the part of the Administrator of FAA.

The significance, I think clearly for IBM, is beyond just delivering a system meeting a contract obligation. If IBM produces on this contract, delivers the world's most advanced system that is going to take us well into the next century, you have an enormous marketing tool. If you fall on your face, you don't.

Mr. EBKER. We certainly understand.

Mr. OBERSTAR. This matter of management and level of involvement is very significant because Mr. Clinger and I recall very well a meeting early on with then-Secretary of Transportation Skinner, who said this is the biggest thing, the most important thing we are doing and I am going to spend time on this. I am going to review this. I am going to see that Chairman of IBM. I think we both said, that is not the role of the Secretary of Transportation; you can't full-time manage a contract.

He was full of enthusiasm and full of zip and vigor; and then what we knew was going to happen did happen. There were big crises like the Exxon Valdez and he was up there in Alaska looking over oil spills, instead of looking over an IBM contract. His heart was in the right place, and he did conduct reviews periodically; but I know we are in the same mode today.

We have a new Secretary of Transportation, all full of energy and zip, who wants to get his hands around this contract and said, I am going to take full charge of it. And I said, that is ridiculous; you are not going to be able to do that. A Secretary doesn't manage contracts; you put the right people in place and give them the responsibility, give them the authority, and then you have reviews periodically and make them answer to you. That is what has got to happen.

We have heard questions raised repeatedly about the contracting process, the way in which FAA procures its systems, outmoded, complex, cumbersome and not suited to the complex technological systems of today. What would you change, Mr. Del Balzo and Mr. Ebker, in the way in which this procurement was initiated and carried out, with hindsight?

Mr. DEL BALZO. Mr. Chairman, contractually, I think we have learned a lot from how we went into the AAS contract with IBM. As you know, we went into this contract based upon design competition. This was our second experience with design competition in an automation program; our first experience was with the development of the Host computer, our second experience was on AAS.

I think the design competition worked extremely well in the development of the Host computer, because the Host computer was totally different than what we are attempting to do on AAS. And the Host case was a very simple problem. Here is the old computer; here is the software that it now works on. Make this software play on a new state-of-the-art computer. Meet us at the Texas center and whatever computer plays the best will win this contract. Very simple, very simple to do. We never had to talk with the two contractors who were in the design competition phase, because the requirements were very straightforward.

That was not the case on AAS. In AAS, we intentionally began by writing a functional specification. We did not write a detailed specification. And we did that on purpose because what we were looking for was a creative design. What we were looking at was the application of innovative technology to meet our functional requirement. During the design competition phase, we were unable to bring to bear the user's expectation on the details for fear of limiting or inhibiting technological solutions.

In retrospect, design competition made sense, but we let it go on too long. It turned out to take much more time and cost us more than it should have, and during that time when you are in design competition, you are shut off from communications with the industry—that is, in the competition phase.

So I would say design competition is effective when you are trying to get creative and innovative ideas, but when you get there, turn it off, and then start interacting closely with the winner of the competition phase, after you have reduced risks, and then concentrate on operational development.

The procurement regulations allow us to do that; we did not take advantage. So we would do it the same way. We would do it through a design competition phase, but we could do it much more efficiently based on what we learned.

Mr. OBERSTAR. Write that in a manual for the future. Mr. Ebker.

Mr. EBKER. Mr. Chairman, let me go back to an analogy that both you and I have talked to already this morning and compare this back to the Apollo program. The Apollo program began when a president said, we will land a man on the moon and return him safely by the end of the decade. There were many times in the decade of the 1960s that we would have liked additional time to do other studies, to do trade studies, to do various prototyping, but we had to make decisions and move forward because we knew the ultimate mission had to be accomplished by the end of the decade. And that schedule-driver forced decisions. And I really believe on the AAS program, the requirements have had preeminence, as opposed to schedule; and I really believe that a program is best driven by schedule with the direction being, deliver the best system humanly possible by a specified date. That converges requirements much more effectively.

Mr. OBERSTAR. Thank you.

Mr. Clinger.

Mr. CLINGER. Thank you, Mr. Chairman. Mr. Ebker, you have indicated that because the schedule really drove you to short-circuit some things, to perhaps do some things that you might not otherwise have done if the schedule wasn't sort of out there—you are still faced with a schedule. We are talking about having a system in place in Seattle by October of 1996. Are you comfortable that that is a doable schedule, that you will not be forced back into the same position you were in that brought us to our present problem?

Mr. EBKER. I am comfortable with the schedule that is in place if the schedule is used to drive some of the decisions that are still in front of us in terms of what the system will look like, some of the functions, how it will be done, et cetera. If we do not use the schedule to drive that, then there is still additional difficulty.

Mr. CLINGER. Mr. Del Balzo, you have indicated that you would agree that there has to come an end to this process, that at some point you have to fix the system and say, okay, we are going to go with this. And yet you do indicate there are going to be changes, inevitably there will be changes. How are we going to reconcile that? We don't want to get back in the position where we have a moving target that is constantly moving beyond the schedule, beyond the times that are set. How are you going to limit that?

Mr. DEL BALZO. There will always be performance requirement trade-offs that have to be made along the way. There are significant differences in the way we are managing today. Up until now, we have not managed this program to a schedule. We have managed the program to a performance that was designed to meet a fixed and hard requirement on which we would not compromise.

For example, there is a requirement in this contract that we have the ability to record the data that shows up on an air traffic controller screen and have the ability to play that data back at 10 times the speed. IBM has told us that 10 times the speed is unreasonable today; we may be able to do it in the future. We did not ask ourselves what is magic about 10 times the speed; maybe five times is good enough. And we are saying today that five times is good enough, and it will allow us to meet that schedule and we will figure out how to update it to 10 times after we field it.

Those are the real-time compromises that have to be made all along the way if we are going to make good on this schedule.

Mr. OBERSTAR. Would the gentleman yield at just that point?

But you have paid for 10 times speed; you are settling for five. How are you going to resolve that later on?

Mr. DEL BALZO. Talking with IBM about what it is that we can get in return, based on a principle of value for value. We have never been able to do that before—not because the regulations preclude us, but because we have always believed the way to negotiate with a contractor is to have a contracting officer talk to the contracting officer, have the lawyer talk to the lawyer, and never involve the technical program manager and the industry program manager.

And we say now it is time to change. This time, value for value gets done at the program level, and the contracting people and the legal people can come and make it whole after the fact—a significant new way of doing business. We don't need a change in the procurement regulations to allow us to do that. We just have to be more flexible in our interpretation of what the rules and regulations allow.

Mr. CLINGER. You both have indicated that you have resolved a number of issues that are outstanding with regard to the program, over 100. But there are two major ones, as I understand, that are still outstanding, one having to do with the flight strips.

What is delaying coming to closure on those issues and what do you estimate will be the time that you will come to closure and resolve those issues?

Mr. DEL BALZO. From the customer standpoint, by the 1st of April, we will have frozen the requirement for these two outstanding issues. IBM then has the challenge of coming back with an operationally acceptable engineering solution, and we believe that is possible. We believe that it will be done consistent with the time schedule.

Mr. CLINGER. Mr. Del Balzo, one of the things in reading over the testimony and getting ready for this hearing, it was my understanding that most of the productivity gains in terms of the industry were coming in the last phase of this overall exercise; that is, in terms of being able to derive faster routes and savings of fuel in more direct routes, et cetera. You indicated in your testimony, though, that the AERA would be implemented somehow into the ISSS operation.

How can you accelerate what we thought was going to come at the end of the process, into the second phase?

Mr. DEL BALZO. We believe that that is possible. We cannot say this absolutely. We are awaiting the results of further research. We hope to have answers in 30 to 60 days.

We believe it is possible to implement what we call an early AERA capability on the ISSS, using the existing Host computer in the air traffic control center and what we call an off-line processor to ensure that when ISSS is delivered, we are prepared to provide to the users a functional capability that does not have to wait until the Host computer is turned over.

Mr. CLINGER. Mr. Ebker, do you agree that is feasible?

Mr. EBKER. Absolutely, and we are looking at a number of alternatives. When I talked about the flexibility of the system, I think this is just one example of how it could be used.

Mr. CLINGER. Thank you, Mr. Chairman.

Mr. OBERSTAR. Chairman Mineta.

The CHAIR. Thank you very much, Mr. Chairman. Let me also thank you for having called these hearings. For eight years I had the privilege of chairing this subcommittee, and it was during that time that we came up with the whole idea of moving forward with this. So there is a great deal of pride that I personally feel in terms of the innovativeness of this program, and we want to make sure that in the future this is where we want to be.

There is a lot of testimony as to what went wrong and everything. I guess I would rather concentrate on where we are going from here.

You have talked about users of the system and the customer. Recently, again under the leadership of this subcommittee, the Chairman and Mr. Clinger, Members of the subcommittee went to General Electric in Ohio, to Boeing in Washington, and to San Francisco to United's maintenance operation center. One of the things that struck me at Boeing is, they have a computer called CATIA, computer assisted three-dimensional interactive application, and they are able to, without building a mock-up of an airplane, know just about everything about that airplane—design, whether or not flight attendants are going to be able to do this or that, whether mechanics in fixing something are going to be able to get their wrench into a place, whether or not the hydraulic lines in the airplane are in the proper place so flaps can operate in every contingency, and so on.

In CATIA and in Boeing's approach there, they started with the end user, the customer, whoever that might be, and then worked back from there in terms of their own specifications. I am wondering in this instance, who is your customer? Who is the user? And how have they been involved?

Mr. DEL BALZO. I would give you a different answer today than I would have given you several months ago.

Several months ago, we would have told you that our customers are the air traffic controllers who have to use the equipment or airway facility technicians who have to operate the equipment. I don't believe that is true. I believe now it is clear that our customers are the people who use the airspace. Our air traffic controller and our airway facilities technicians are providers of a service, so they must use the equipment that we are developing, but they use the development to provide a service for the real customer, and the real customers are the people who use the airspace.

We have to reestablish a relationship with the real customer to be sure that we understand what the real requirements are what will drive the design that we provide to our internal people, to provide the service.

That is a completely different mind-set for us. I think we are slowly coming to understand the difference. I think that understanding really became clear to us a week ago when we invited representatives from the real customers—the trade associations, from the airlines, from the airport organizations—out to the demonstration facility with us. We shared with them our assessment of the program, and we spent a long time talking about what it is that this program is going to provide in terms of benefits to the real customer.

So I think what you can look forward to on the part of FAA is a changed mind-set focusing on the end customer and the payoff to the end customer.

The CHAIR. But by the same token, the occupant of that airspace is an airplane that has some very highly sophisticated communications and computer gear on board and there is an internal conflict between the user of that airspace, the airline trying to put into their aircraft highly technical, capable equipment and at the same time an advanced automation system that may not, in terms of the future, be able to accommodate the technology that is already in the airplane, including, let's say, ground-to-air datalink, in terms of a lot of other innovations.

I come from Silicon Valley; we have all kinds of things going on. The technology is obsolete in two years. You say we are freezing technology in time so we can move ahead; that was one of the old complaints I had, that FAA always said there is something better around the corner. Let's wait until it comes. Consequently, we never really got improvements.

I am wondering—how do we make these improvements two, five, eight years out, including something that I think is still going to be coming—in our county we are going to be building a superhighway of data transmission within our own community so people can do interactive computer work, and I am wondering whether or not, without changing those requirements today, are we still going to be able to take advantage of future changes in technology as well as some of these things that we haven't discussed here? In terms of the automated en-route situation, in terms of the ground-air datalinks, what are we going to be able to do as we go along?

Mr. DEL BALZO. Mr. Chairman, the good news is that the answer to that question is yes. We are building what is called an open system architecture. We can freeze the requirement today, but as a transition from tomorrow and a year from now, the AAS system has not yet incorporated the datalink function. It will be easy to do. It will be done with a chip. It is an open architecture system that will allow us to continue to add functional capabilities without a complete redesign. It is much easier for us to freeze requirements today, knowing we can update later on.

The CHAIR. The problem is you are trying to make this as sophisticated as possible. Maybe right now when you hit a switch or do something in terms of instructions on the console, now you are going into something much more expansive; and again, when we are talking about time delays and planes coming at each other, I am wondering whether or not that distributed architecture—off the shelf, open architecture, whatever you want to call it—whether or not we are making something that works pretty well today doesn't become so much more complicated that it really creates problems.

Mr. DEL BALZO. Mr. Chairman, I can only tell you, in my judgment, I think the architecture we have deliberately chosen will give us the flexibility without undue complications. I think we have done the right thing with the open architecture that we have chosen.

The CHAIR. I guess I am going to be sort of like Zsa Zsa Gabor's ninth husband or something. I am just hoping that whatever I am going to be doing, I am going to make interesting and make work, have it work at some point. And so you know, we are watching this very closely on this Committee.

It has cost a lot of money, a lot of time, but I don't know whether or not—I have seen this ISSS schedule, system one. Maybe what we have to do is initiate an Oberstar report card on the FAA on this project.

We had a report card before when I was chairing this subcommittee. It seems to me maybe we are going to have an Oberstar report card on the FAA, on the progress of this, and watch it very closely.

Mr. DEL BALZO. If you choose to have a report card on that program, I would like the first grade on April 19th when we demonstrate System One successfully.

The CHAIR. We had the Mineta report card before. I would like some results. It got some results; I know the Oberstar report card will do as well.

Thank you.

Mr. OBERSTAR. Thank you, Mr. Chairman. Certainly you have been here from the very beginning. It is under your chairmanship of this subcommittee that all of the expansive programs of modernization of the air traffic control system started. You authored the legislation and you pushed it through the committee and through the House and through the appropriation process, to see to it that we started on that course. And here we are, a decade later, almost a decade-and-a-half later, from the inception of it and still not there.

We are going to do whatever it takes, I assure you, Mr. Chairman. I would like Mr. Ebker's response to the Chairman's last question.

Mr. EBKER. On the question of architecture, the only comment I would add is that it is interesting that the new Boeing design, the 777, is a distributed open systems architecture very similar to what we are using on AAS. I really believe that it is the latest architectural development, and I think once it is implemented on both the aircraft and the ground that we will have maximum flexibility to move function to the appropriate platform for the right response of the system. So I really am encouraged by the new developments in aircraft designs.

Mr. OBERSTAR. Moving away from main program to modularity gives you the flexibility, without having to stop all systems and redesign it.

Mr. Horn.

Mr. HORN. Thank you, Mr. Chairman. I wanted to pursue what I thought were some wise words both of you had about how we could improve in this area. And I am thinking two ways. Let's say it was your equivalent in another national air system that came to you and wanted some advice, or just another official in this government that had a highly technical project, much like this; and we will be increasingly dealing with this type of thing.

You made a couple of points where you thought maybe improvements could be made—the design competition should have been ended earlier, an earlier interaction between the professionals of both the vendor and the customer.

I wonder if a person from this government or one abroad came to you and said, you have been down this line; what three bits of wisdom can you give to me so I can effectively and efficiently pursue my project, which has about the same dimension as yours was? What would you say in response to that question?

Mr. DEL BALZO. Realistic requirements, that you are absolutely certain can be met by technology. Don't base a requirement on something that requires a technology breakthrough. Attention to detail from beginning to end. And commitment to a schedule.

Mr. HORN. Mr. Ebker, would you add anything to that?

Mr. EBKER. Back on the requirements, let me say there is always the press of schedule in the early part of a project which frequently forces the parties to go into a full development mode before the requirements are completed and at least semi-frozen. I think most programs, in retrospect, waste or do not use efficiently the development resources by starting too soon into the development process, not spending enough time in the design, and the requirements and design process that can be done with a smaller team before the team is actually built up.

Second of all, recognizing that there is nobody in government or in industry that is smart enough to know all of the answers up front, or at any point in the process, recognize that very close cooperation and communication are absolutely essential.

Let me say I really applaud Joe Del Balzo's participation throughout the project in encouraging team building between FAA and IBM, although we haven't done everything as well as we could. I really believe that cooperation has been one of the real strengths and will see us through to a successful conclusion.

And, third, I really believe the emphasis on schedule really enforces results.

Mr. HORN. I think Mr. Del Balzo's point that impressed me was not waiting for the technological breakthrough; that means internal discipline in the program. How do we accomplish that, have somebody there that is sort of the emperor-has-no-clothes youth who says, wait a minute, folks; you are leading us down a line we don't need to pursue.

Mr. DEL BALZO. I think there is a lot more discussion that needs to take place before we actually enter the procurement cycle. We are not smart enough in government and never will be to know what it is that technology will provide. Somehow we have to come to closure with industry before the acquisition cycle begins as to what is possible, and then match requirements to what is possible. We need to do that better than we have before.

Mr. HORN. Now, having heard both of you on this, I am a little worried, as a previous questioner was, about the ability of the FAA Administrator to suddenly be the one that pulls all the pieces together. Reality is going to be someone in that office—what people are going to touch base, because the FAA Administrator is going somewhere in a plane, speaking, or going somewhere to do something. How do you solve that problem on management for the remainder of the project?

Mr. DEL BALZO. I will tell you that what we have done is we have not just fixed the problems. We fixed the problems back in 1990 when we absorbed the 19-month delay. We fixed the problems to get us back on schedule.

We did something different this time. We didn't just fix the problems. We fixed the causes of the problems to ensure that those same problems don't come back to plague us again.

We have made sure that there is management attention. We have increased the visibility of the program. We have provided high-level operational involvement. We have fixed the decision-making process on this program. We have instituted requirements discipline, and we have a commitment to manage both schedule and cost.

When the causes of the problem are fixed institutionally, I think we would then revisit, as Mr. Ebker will, whether or not this particular program continues to report directly to a new Administrator. What is important for us is to react to a major problem today and do what we think needs to be done to fix both the problem and the causes of the problem. We may revisit that when this program gets stabilized in a couple of months.

Mr. HORN. Mr. Ebker, do you have anything to add?

Mr. EBKER. I would just say that I think Joe has sent a very clear signal through the FAA by delegating the authority to make any decision as long as it doesn't affect schedule, and that sends a very clear message that schedule is very important, and it is going to be enforced at the administrator level; and that will drive a lot of day-to-day decision-making.

Most decisions that can be made won't involve his personal involvement. And I think that tone will filter down and change the context.

Mr. HORN. Thank you, Mr. Chairman. Mr. Mica, before he left, did want these questions asked. You might wish to ask them.

How much will it cost?

Is your current statement based on the delays that have occurred?

And are there any more delays anticipated that perhaps couldn't be straightened out in this reorganization?

Mr. OBERSTAR. You can submit those responses for the record, unless you are prepared to answer.

Mr. DEL BALZO. We are prepared to provide you with cost information. I would prefer to submit a more complete response on cost for the record.

Mr. OBERSTAR. Yes. That will be fine.

[The information received from Mr. Del Balzo follows:]

The total cost of the AAS program is $5.1 billion. We estimate that there is potential cost growth of $93 million due to the 14 month delay, some of which will be shared by the contractor under the incentive fee provisions of the contract. The cost growth will not materialize until 1997 or later. We do not want to increase program funding until absolutely necessary. We are making cost containment a high priority in this program, and hope to avoid some or all of the estimated cost growth.

Mr. DEL BALZO. To answer the second half of the question on delays: we anticipate no delay on the program we are now talking about. We will be in Seattle in 1996.

Mr. OBERSTAR. Mr. Geren.

Mr. GEREN. Thank you, Mr. Chairman. I have been sitting here trying to figure out how—to see how this seat works. I am afraid it is going to eject me. I want one that allows me to sit up straight.

I appreciate the chance to learn about the program, and I particularly was interested in the questions Mr. Horn asked about some of the internal changes to try to do a better job at defining what we want and how we can kind of hang with that over the years.

This system has certainly set some very high goals for itself, and the extraordinary high level of reliability of the system with only three to four seconds of downtime expected a year, that just almost seems like an impossible goal to attain.

Is that a realistic number, and could you increase it to—increase it tenfold; and you are talking 30 to 40 seconds. Are we talking about giving a margin that would cause severe problems for the customer as you have defined the customer, Mr. Del Balzo, or would it save us considerable sums in cost in on-time delivery of the system? Is that an issue that is causing any of the problems?

Mr. DEL BALZO. Congressman, FAA is a very conservative organization. Safety has always been our first priority and always will be. We have always developed systems based on a reality goal of 99.99999, translating into three seconds of downtime throughout the year.

Built into that concept is a lot of redundancy and a lot of backups. What we would do is, if our business partner were to tell us that 99.99999 is technically unachievable, we would again talk about what is achievable, what are the backups and how can we make up the gap in reliability through another set of redundancies.

We have introduced a lot of additional capabilities into the air traffic control system; we did that years ago. We now have airborne collision avoidance systems that can maintain self-separation between aircraft. When we begin to take more advantage of that airborne capability, we can then afford to back off on ground system performance requirements.

So it is a whole series of trade-offs that we continually go through.

We believe today that 99.99999 is still achievable in this program, consistent with the schedule that we have laid out; and we also believe that if we were to compromise on that reliability figure today, it would not get us to Seattle sooner. If we believe that by dropping off a nine we could save a year, we would do that. That is not the case in this program.

Mr. GEREN. Mr. Ebker.

Mr. EBKER. I would just add that the seven nines of availability are the most demanding standard of availability that I have ever seen, and I believe are more stringent than on any system that has ever been implemented. There is no question in my mind but that we have pushed the state of the art to accomplish seven nines of availability, but we believe all of our analysis indicates that it is achievable.

It is our design point, and while we may not be fully there on the first day in Seattle, we will continue to press that limit until we actually achieve the full seven nines. But we really have pushed the state of the art to accomplish that.

On the other hand, you consider the role of this system in controlling public traffic, this is the kind of system that you like to push the state of the art for.

Mr. GEREN. Do you have any way—and perhaps there is no way to estimate this—but how much we pay Does in time or money for every nine? Obviously, you don't want to put a dollar value on human life, but if you carried that to its maximum extreme, we would all be driving around five miles an hour. And I wonder, in asking for this standard, how much are we paying for it.

Is there any way to figure the difference between, nine nines, seven nines, six nines, five nines? How much of the technical problems that you all are facing and the costs are associated with pushing the envelope on this point?

Mr. EBKER. At this point, it probably becomes a little bit judgmental, and Joe and I might even disagree.

Personally, I believe that the last nine has cost a great deal. Quite possibly, as I mentioned, pushing the state of the art—maybe we are pushing it too quickly, a year or so in the process. That is one of the things I think that, between ourselves and the FAA, we will go back and second-guess ourselves when the system is fielded.

At this point, achieving the seven nines is achieved, and we will press on and make it happen.

Mr. GEREN. You said cost a great deal. Are we talking about hundreds of thousands of dollars, millions of dollars? I am not asking you to be specific, but I am just curious what sort of dollars are we talking about.

Mr. EBKER. I have not gone back to quantify that. Again let me assure that my whole focus in being here is how to get from here to Seattle by the end of 1996. Over time we will able to look over the lessons we have learned. I have, I would guess, in the back of mind, totally unsubstantiated at this point, the—I personally suspect we spent more for that last nine than might have been appropriate, but I don't have a number for it and I may be wrong.

Mr. GEREN. Thank you.

Thank you, Mr. Chairman.

Mr. OBERSTAR. Good point.

Mr. Ewing.

Mr. EWING. No questions.

Mr. OBERSTAR. Mr. Duncan.

Mr. DUNCAN. Thank you, Mr. Chairman, and I will be very brief.

I have been in other meetings and haven't been able to hear a lot of the testimony, so I apologize if I ask something that has been covered, but I see that according to a briefing paper we have, the first expenditures on this program were made in 1983. What were the original cost estimates at that time? What was the total cost of the program supposed to have been at that time?

Mr. DEL BALZO. I believe the total cost was $2.5 billion in 1983, including all costs.

Mr. DUNCAN. And what is the best estimate of the total cost now?

Mr. DEL BALZO. $5.1 billion. But that is not a one-for-one comparison. The original cost estimate did not take into account space expansions that had to be done at our air traffic control centers to accommodate the new equipment. It did not take into account the training that had to be provided. It did not take into account a lot of the F&E costs associated with the implementation and logistics support of the system. So it is not really a fair comparison. The fair comparison, the one-for-one comparison, is made on the contract value between 1988, when we signed the contract with IBM, and the contract value that we are looking at today.

Mr. DUNCAN. What is the comparison there?

Mr. DEL BALZO. The 1988 contract value was $3.6 billion. The value that we are now looking at is $3.9 billion.

Mr. DUNCAN. It just seems that on every government program that we hear of from every department and every agency they always low-ball the cost when they first come to the Congress, and then the costs far exceed any original estimate—the space station, the Supercollider, this program, almost any program you want to think of. Is that also your explanation as to why the original delivery date has been delayed from 1990 to, now, 1996?

Mr. DEL BALZO. The delays have occurred for a variety of reasons. The delays have occurred due to requirements changes that have been imposed on this contract by FAA throughout the process. The delays have been incurred because of a management discipline on the part of FAA that was not in place. The delay has occurred because of the sheer size of the program and the number of lines of code that had to be written in a new language that both IBM and FAA were learning.

So the delays have occurred for a number of reasons, having little if anything to do with low-balling the schedule. I don't believe in this case that would apply, sir.

Mr. DUNCAN. Mr. Del Balzo, people out in the country have a greater concern today about the national debt and the deficits than I would have ever imagined, and there is just a tremendous concern about our forays into other initial debt; and many, many people are beginning to question whether the Federal Government can do anything in an economical and efficient way. And when we see and hear about problems such as in this program, it just seems to lend credence to that belief.

Do you think that we are going to next year, or two years from now are we going to hear of continued problems with this program? Are we getting these things finally straightened out?

Mr. DEL BALZO. Congressman, I believe that what we have done is come to grips with the causes of the problems. I believe that if our performance were measured from here on to completion, this would be a success story and it would be a model of how government and industry should be working together on a program of this magnitude. I cannot say that from the beginning of the program up until now, but I can look you in the eye, and based on what we have done, when we go to Seattle in 1996 we will go there with your applause.

Mr. DUNCAN. One of the papers I have says that no schedules for new projects are difficult to predict. Within a year of starting work on the contract, IBM and FAA announced a 19-month delay. The delay was the result of miscalculations by both FAA and IBM. And it goes on to say that FAA admits that five of the 19 months were due to additional contract requirements, but the rest of the delay apparently you blame or put on IBM.

Has IBM been required to provide any type of compensation for these very expensive miscalculations, very expensive to the taxpayers?

Mr. DEL BALZO. Congressman, let me speak first for FAA, and I am sure that Gerry can add an IBM perspective.

I believe that the reasons for the 19-month delay were jointly shared by FAA and IBM. There was no question that FAA made significant requirements changes leading up to that 19-month delay. I also believe that both IBM and FAA underestimated software complexity with the amount of time it would take to translate what we learned in experiments that were built into the contract into operational code.

I think we underestimated the learning that would be required and how long it would take to write code in a new language and develop the tool sets and the environment to support that new language.

So I do not place most of the blame on IBM. I believe that there is a shared blame between FAA and IBM.

Mr. EBKER. Let me add, Congressman, that the contracts are such that some elements are cost-plus, some are fixed price. Let me assure you that IBM is not making a profit on this contract, because of the contracting terms, and we have shared fully in the responsibility fiscally as well as publicly.

Mr. DUNCAN. But the costs are going up to the taxpayers because of these screw-ups; is that correct?

Mr. EBKER. Bottom line cost has increased, yes.

Mr. DUNCAN. All right. My time is up. Thank you very much.

Mr. OBERSTAR. Mr. Coppersmith?

Mr. COPPERSMITH. Thank you, Mr. Chairman. I wanted to follow up on an answer given to the Chairman's question. Who is the customer, who is this system designed for? I think Mr. Del Balzo had indicated that, before, the focus was on the controllers and technicians, but now the focus is more towards the people who fly in the system.

What does this mean as development continues? Does the FAA plan to start monitoring the system if you get complaints from the controllers and technicians who are unhappy with the ISSS? How is that broader focus on who your customer is going to be translated into how this contract is administered by IBM and FAA?

Mr. DEL BALZO. From the beginning we have ensured that the providers—air traffic controllers and airway facilities technicians—have been involved in the design and development of the Advanced Automation System. From an air traffic controller's standpoint, we have had over 300 air traffic controllers involved most every step of the way on each of the phases of the advanced automation system program.

Today there are 10 air traffic controller user teams that are supporting this program. On those 10 teams, you have a total of about 125 air traffic controllers. On every team there is a working air traffic controller who has been designated by the air traffic controller union, representing the entire air traffic controller work force.

There is no question that the involvement of our providers is critical in the development of just about any system that we produce. It has to be acceptable to them because in the end, they are the system operators and users who provide the service to our end customer.

I believe that based on the work that we have done in our demonstration facilities—and I invite you to take the time to visit with us in the demonstration facility, where you can actually see the providers of the system working side by side with the developers—we will field a system in Seattle that will be operationally acceptable to the providers.

Mr. COPPERSMITH. Thank you. I was just trying to see exactly how, in program terms, the shift in definition of who the customer is might affect your decisions.

Mr. DEL BALZO. The shift occurs by asking ourselves what is the end result of what it is that we are producing. So on the one hand we have an issue now that we will do electronically what air traffic controllers now do with a grease pencil when they write what we call flight strips, the provision of electronic flight data. That is not just nice to have for controller convenience; there is an end payoff to the system user by having that data done electronically, rather than manually, with a grease pencil. All of the benefits that we get from AAS will provide end-user benefit. The reason that we are doing AASs is not just to replace old technology but so that it will be more reliable and easier to maintain from our technicians' standpoint.

We are not introducing new technology just because it will be more convenient for air traffic controllers to work in a better environment. We are introducing this new technology because there are end benefits to the users of the airspace and we don't ever want to lose sight of that.

So for every requirement that we build into a development program, we really have to ask ourselves, how will that benefit the end customer who in the end is paying the bill? And, Congressman, we have just not done that enough in the past. We need to pay more attention to that than we ever have.

Mr. COPPERSMITH. Thank you, fair enough.

How did the IBM remediation plan that the administration, i,e., the FAA, rejected as insufficient in late December become adequate? What kind of changes have we seen over the past few months that enabled the FAA to deem the plan adequate? What changes have been made?

Mr. DEL BALZO. More details that would give us confidence in schedule integrity, more details that say we are not just looking for a delivery date to Seattle.

What we want to see is a schedule of closely spaced milestones a week apart, if you will, so that we can have real time assurance that we are on a schedule to Seattle that we can make good by October of 1996.

For example, a major milestone for us will occur on April 19th of this year. That is the day when we will be actually demonstrating 28 common consoles operating for six hours. Between now and

April 19th, when that demonstration takes place, there are 50 separate things that we will be monitoring, watching to see happen, so on the first reply that we get back from IBM, we will see something called System One Demonstration, April 19th, 1993.

We say that is not good enough. What we really want to see is everything leading up to that so we can have confidence that April 19th, 1993 is a date that we can make good. Those are the kinds of things that we are looking for.

Mr. COPPERSMITH. Thank you.

Finally, how does the FAA respond to the organizational problems that have been discussed today? What specific changes have you made and what role might this committee play, and what sort of changes need to be made and what sort of assistance do you need to see from the other parties interested in seeing the system completed?

Mr. DEL BALZO. I think the changes we have made, in my view, encompass all the changes that need to be made from a structural standpoint. Raising the visibility of this program, ensuring that it has high level operational involvement on the FAA side. Instituting requirements, discipline by freezing requirements; elevating the program so that it reports directly to the Administrator for oversight, visibility, and direction; and a commitment to manage this program from now on to a schedule. Those are the things that we put in place that I believe don't just correct the problem, but correct the causes of the problem so it will not happen again on this program.

Mr. OBERSTAR. The gentleman's time has expired. Ms. Brown.

Ms. BROWN. Thank you. I just have one quick question. How will this system affect the personal—the needs of manpower and womenpower in the future, keeping in mind that a system is only as effective as the people that are using it and their training.

Mr. DEL BALZO. It will do a couple of things. It will make the job of an air traffic controller easier and less labor intensive. It will make the job of an airway facilities technician, who is responsible for maintaining this system, easier and less labor intensive. It will increase the productivity of every person that is associated with this system from an operational or a maintenance standpoint. It will reduce the requirement for increases in the air traffic controller or technician environment by increasing productivity. And it certainly provides the entire work force with a much more acceptable work environment than they are working in today.

I think it is a program that, when completed, everybody wins. The taxpayer wins, the users of the system win and the providers of the system, our people, also win.

Mr. OBERSTAR. April, one year ago, the FAA's officers of acquisition policy and oversight conducted an assessment of the status and technical risks of FAA's advanced automation system software development and made a number of recommendations—which, parenthetically, this committee attempted to obtain at the time and were delayed, obfuscated in getting, but we did get it ultimately. This report says from an overall perspective, the assessment team recommends that FAA and the prime contractor enhance their ability to mitigate programmatic risks for IFF and future segments by accelerating the process of institutionalizing lessons learned from the peripheral module replacement item in past ISSS activities.

It goes on to make other similar recommendations, one of which is to identify errors not present in the current system that are known to exist in multisensory tracking systems, and strengthen participation resources and oversight of the AAS in selected areas.

What was done about that report? What was done in your own assessment.

Mr. DEL BALZO. Mr. Chairman, I think what you will find is we have institutionalized the findings of just about every audit that has been done. I believe that—and I hope you will hear this from our colleagues in GAO—the recommendations that they have made in previous audits, we have in fact implemented. I believe that you would hear, if people were here from the Transportation Systems Center, that the recommendations they have made on this program we have in fact carried out.

Mr. OBERSTAR. But this was last April, and it took until November for a cure order to be issued. What slipped in between there?

Mr. DEL BALZO. I think that we were caught by surprise with the 14-month delay announcement in November. We were not prepared for that.

We had estimated on our own a four, five, six-month delay; 14 months came as a complete surprise to us. And I believe that Gerry would tell you that it came as a surprise to IBM as well.

The April report got our attention, as well it should have.

What also got our attention was the 14-month slippage in November.

Mr. OBERSTAR. Was this primarily a lack of penetrating observation and involvement at the top in both IBM and FAA?

Mr. DEL BALZO. I can't speak for IBM. It was certainly a problem in FAA. We did not have a system that we could probe into, so even if the attention to detail were at the top, we did not have a management system that we could probe.

There is a significant difference in what we have now done. What we have provided is a detailed network milestone that we can actually probe and know, day-by-day, exactly where we are. We did not previously have that capability prior to November.

Mr. OBERSTAR. Do you have this written down in an organizational chart? Not that that is necessary, but you have an operational mode now by which what you have just described, in fact does take place?

Mr. DEL BALZO. We are now in the process of institutionalizing what you would call "lessons learned" from this program, so that not only do we fix the problems and the causes of the problem on this program, we actually apply the lessons learned, the good and the bad, to every procurement and acquisition program that we are now involved in, and the future ones as well.

Mr. OBERSTAR. Mr. Ebker.

Mr. EBKER. I would just add the fact that a number of people are in significantly different responsibilities today than they were six months ago is an indication that this is not business as usual. We were surprised, as Joe said, and that type of surprise is unacceptable.

Mr. OBERSTAR. I am very insistent on lessons learned from other systems. Some years ago when Mr. Clinger and I were working in tandem on the Investigations and Oversight Committee, we were focused on safety—safety in the air traffic control system, safety in pipelines, safety in bridges, safety in the highway system. And we kept finding that program managers in the Federal Government were not learning from each other, that they did not have common understanding and even definition of what safety meant.

If you don't understand what it means, how can you conduct it? How can you do it? And they weren't learning from each other. And lessons learned in one, marked for identification, certainly were applicable in a systems sense to other modes.

That is what we are asking you to learn and to apply, and I am getting the sense that that has happened.

Should there be an outside panel review of where both IBM and FAA stand at this time, as has been suggested in certain quarters, there be some blue ribbon commission to come now and look at this program? Or would that cause some further delay?

Mr. DEL BALZO. At the risk of sounding defensive, I would say time has passed that by. I believe that we in fact have done that; I think we have done an objective audit of our own house. I think IBM has also done that.

We began a process of sharing the results of that audit with the user community a week ago. We are going to continue that. We have charted an independent review by TRW, which we have asked to get the best minds that they can find and do a complete audit of the software, the lines of code that have been written, to ensure that the integrity that we believe is there is in fact there.

I don't believe an independent audit at this time would pay off. In fact, I think there is a good chance it would set us back some.

Mr. OBERSTAR. What sort of agreement is there with TRW to do this review? Is that a written contract?

Mr. DEL BALZO. TRW is a major support contractor on this program. We have asked them at a very high level and they have volunteered to do this at no cost. They are assembling now the best minds in the industry that are available to begin this very thorough audit of the insides of the program—not the management of the program, but the insides of all of the code that has been written. They plan to have initial results for us in four or five weeks.

Mr. OBERSTAR. Well, I think that is a very good move. It would be very useful, and I would like to have that information provided to the subcommittee concurrently with the submission to FAA.

I am concerned about so-called outside panel review because it may slow down what is already under way, what has already been achieved. There might be a tendency on the part of both FAA and IBM to say, well, it is somebody else's responsibility. We will just sort of slow down and stop in our tracks at this point. I think that would be fatal to this system.

Mr. DEL BALZO. Mr. Chairman, I would agree with that. I believe that IBM and FAA caused the problem. We would like one more chance to fix it.

Mr. OBERSTAR. There have been numbers of calculations of the benefits of the entire automation program, the entire $31 billion program, benefits to the system user, to airlines, to air travelers.

The productivity improvements, cost savings to be achieved over the decade-long period of time in which this system is being instituted. Those savings, as I said, are estimated to be in the billions of dollars.

But it has always seemed to me that those savings are more toward the end of the process or the end of implementation of the system rather than at the midterm or the early part of it. Understand, I am not being critical about that.

What are the productivity improvements from AAS in all of its components, or from the ISSS? What are the productivity improvements that you anticipate—I want Mr. Ebker to be thinking about it, too, because I want you to respond—that you anticipate, and how do you measure productivity improvement?

If you measure it by saying, we will be able to do the sector suite job with one instead of three controllers, I am not going to buy it. So I am sort of dictating your answer, but in one sentence.

Mr. DEL BALZO. I have a two-part answer. One, you are absolutely correct that the major benefits from AAS do not come until AAS is complete. The major benefits from AAS are user benefits and not internal FAA productivity benefits. The major user benefits do not accrue until ISSS is in place, until AERA is functioning on ISSS, whether it is functioning on an outboard processor in the Host. That is critical. The major benefits to the program don't occur until the program is complete.

There will be incremental productivity benefits as each segment of the program gets implemented. How do we measure those internal productivity benefits? Frankly, not very well. We are awaiting the results from a cost benefits study that the Transportation Systems Center has been charted to do; those results should be available prior to the end of April.

For the first time, what they have attempted to do is quantify benefits from this program, piece by piece, so that what you will have in about 30 days from TSC is quantified benefits as a result of ISSS, quantified benefits as a result of TAAS, quantified benefits for each particular piece.

I am not prepared to comment on the value of that study until I see how it is done. I am a little bit skeptical.

Mr. OBERSTAR. Mr. Ebker, your response; and then I might turn to Mr. Clinger.

Mr. EBKER. Mr. Chairman, let me say, I think there are classes of users and I believe that the flight controllers are a class of users of the system—even as the next class would be the airlines, and perhaps the next class would be the flying public themselves—and the system is intended to bring benefits at all levels.

The initial installation of ISSS should bring significant productivity improvements for the flight controllers.

Now, I am confident that we won't replace three controllers with one controller, but it should allow the controller to handle more traffic more easily than he could have before. I think it will allow—the controller will have time available to then supervise additional function that will be brought on line in subsequent systems; and in all of those—all are real productivity factors, perhaps difficult to measure, but real productivity that will show up in more efficient scheduling and more efficient passenger miles.

Mr. OBERSTAR. I thank the gentleman.

If the gentleman from Pennsylvania would be patient for another moment, some years ago, Mr. Clinger will recall we were sitting here in these same two chairs asking FAA about the number of air traffic controllers and safety of the system; and we were given a set of figures, and we did some checking and found that FAA inflated those numbers by calling air traffic assistants, or counting an air traffic assistant who was a stripmaker an air traffic controller.

That led into an extensive inquiry of the whole way we are designating air traffic controllers, and we ultimately found that FAA was counting as controllers some people who weren't talking to traffic, not counting as controllers people who were talking to traffic—personnel supervisors, for example, who are at least spending 10 percent of their time on control.

What I am getting at is, if with the electronic flight strip information, FAA says we now have improved productivity by the ability to eliminate a position, without having made a determination as to whether the work load is going to increase or be unsupportable for two, or maybe even one controller, then you haven't improved productivity and may have reduced reliability. And I don't know if you have come to the point of answering that question yet, because this part of the software is still being perfected.

Mr. DEL BALZO. Mr. Chairman, that is exactly right.

Mr. OBERSTAR. At one point, if I recall, that portion of the console would have required as many as 100 keystrokes to pull up certain information. Now that has been greatly reduced, but those kinds of things are not improvements in productivity. They are increases in work load.

Mr. DEL BALZO. Mr. Chairman, I think that is the key reason why we cannot speak intelligently about productivity benefits today. Until we get to Seattle and start operating this new technology with real air traffic controllers, we don't know the kind of productivity gains that we are buying.

So what we have done, up until now, is that we have guessed. We have used our own experience and our own judgment, and I just don't put very much stock in those numbers. I put a very high value on benefits to the people that are using the airspace. I understand how we can measure that.

It is not clear to me how we can measure with any level of confidence actual productivity improvements in the technician work force or the controller work force. I think we need to get more operational experience.

Mr. OBERSTAR. Thank you. That answer gives me a lot more comfort.

Mr. Clinger, thank you for your patience. I appreciate the opportunity to pursue that matter.

Mr. CLINGER. Thank you, Mr. Chairman. I just want to applaud both of you gentlemen for your candor here this morning, and also say that I am encouraged by your optimism and certainly your commitment to the reforms we are talking about.

You will, I think, appreciate that there is a measure of skepticism on the subcommittee, because in some ways we have heard this before, and we hope we are not going to hear it again. I am sure that message has come through.

I just have a couple of questions. Given the timetable we are talking about and pointing to October of 1996, are there any technological barriers, are there any unknowns in terms of technology that doesn't exist at this point that you are going to have to solve to get there; or is it really just a question of slogging through the process here? If you get what I am trying to ask, is there something you don't know now that you are going to have to solve before you can say for sure you are going to get to the end line on time?

Mr. EBKER. Joe discussed two major problems still to be solved. One had to do with electronic flight strips, which I don't think has any technological risks or problems.

The other one, continuous operations, is of concern to me; and we need some dialogue to understand exactly what's required and how to implement that. The problem in continuous operations is how do you operate a system that is already on line and operational, and in a distributed network, keep all of the processors in sync as you go through this updating process?

That is not a trivial problem. I don't know the answer today. My engineers don't know the answer today, but this is one where we will have to work on and struggle through and come out with a design. So I would just say I have a concern. I can't tell you today that it is a show-stopper. We just need time to work that one.

Mr. CLINGER. With regard to the flight strips, it certainly is apparent that a lot of time, money, and resources have been expended on developing a replacement for the paper flight strips. I guess the bottom-line question is, why is it necessary to replace them? I mean, the system works well. The controllers seem to like it. Do we need to reinvent the wheel, or is it just that we are trying to build a better mousetrap. If it works well, why in this case fix it?

Mr. DEL BALZO. It is very labor intensive. It takes a lot of the controller's time. The controller will tell you that they would like more flexibility on how they can access the data than they have today. It is basic—the printing of flight strips is not a trivial thing. It is done by mechanical printers that break down.

There is a benefit to automating the flight strips. We have promised controllers for years that we would be providing them with automation tools to make their job easier and less labor intensive. I would be embarrassed to wind up in Seattle without electronic flight strips when in fact we can do it. I think you will hear that controllers are expecting this kind of a capability when the air traffic controller union testifies today.

I would be embarrassed to deliver a system without it.

Mr. CLINGER. Thank you, gentlemen.

Mr. OBERSTAR. Mr. Ewing?

Mr. Horn?

Mr. HORN. I have just one question.

Mr. OBERSTAR. Mr. Horn.

Mr. HORN. Just one question in response to a question of Mr. Duncan. The 1988 contract was $3.6 billion, and the estimate in 1993 of the base contract was $3.9 billion and that doesn't include the space and all the other things. Has that been adjusted for cost of living, inflation, so forth; I am just curious for the comparability of the figures.

Mr. DEL BALZO. No, it has not.

Mr. HORN. Could you just furnish for the record what an adjustment would be?

Mr. DEL BALZO. Yes, I will.

[The information received from Mr. Del Balzo follows:]

The contract was increased from $3.6 billion to $3.9 billion due to changes such as revising the ISSS implementation approach, changing the TCCC computer human interface to make TCCC operationally suitable, and hardware and software changes necessary to interface with existing and future air traffic control equipment. The contract is written in current year dollars, so none of the difference is due to inflation, cost of living, or other economic adjustments.

Mr. OBERSTAR. In that same vein, if the gentleman would yield, GAO has estimated that the delays will add a $235 million cost to the program. Is our understanding correct that IBM will absorb virtually all of those additional costs?

Mr. DEL BALZO. We have not yet begun negotiations with IBM. We will be negotiating costs, the actual details of the schedule and requirements. That process will begin on April 15th when we ask IBM to submit to us a formal proposal.

GAO has estimated a cost growth associated with this 14-month delay, I believe, on the order of $200-some-odd million. I am not prepared to accept that number, nor is IBM, until we get into actual cost negotiations.

Mr. OBERSTAR. Thank you. The gentleman from California.

Mr. HORN. Let me just say, Mr. Chairman, I have heard a lot of witnesses, have been a witness, and have written about the effective witness; and I want to thank both gentlemen. But particularly on the government's side, I want to say, Mr. Del Balzo is one of the most effective government witnesses I have heard. Certainly, in succinctness and getting to the point and trying to give us the information of what they have learned, I have been particularly impressed.

Mr. DEL BALZO. Thank you.

Mr. OBERSTAR. Refreshing candor I might add.

Mr. Duncan.

Mr. DUNCAN. We have a report from the GAO that we are going to hear some testimony, a witness we are going to hear some testimony from shortly, and it says here that the estimated cost of the AAS rose from 2.5 billion in 1983 to 4.8 billion when the projected production contract was signed with IBM in 1983. The current cost estimate is 5.1 billion. We have covered most of that.

One thing that I am not quite clear on, in this report from GAO, it says scheduling and cost problems have worsened over the past year.

Now, this is a program that we started working on in 1983. This is 1993. Did the changes that FAA required, have they just come about within the past year? Why have these problems worsened over the past year? In other words, if we had had this hearing a year ago, would we have come in here and gotten some glowing report at that time? Did nobody see this coming or——

Mr. DEL BALZO. In fact, we did.

Mr. OBERSTAR. In fact, we did a year ago and two years ago, and before that we kept getting glowing reports. You have problems, but there are no more show-stoppers.

Why is it that all of this has developed over the past year? Why have they gotten worse over the past year?

Mr. DEL BALZO. Over the past year we have been heavily involved in the actual writing and development of the software code. We ran into problems during this past year as we got into the details of writing and testing code that we could not have foreseen two years ago. So you might ask, well, why is this any different than it was two years ago? I think there are several things that are different. We are at a significantly different point in the program. The software is developed. We have 1.1 million lines of software that have been developed, and we are now in the process of testing. The software is beginning to test well and gives us a feeling of confidence. What is different is that we are at a point in the program where the hardware is problem free.

The testing of software is behind us, and that is the major problem, so that is one significant difference.

The second difference is that we didn't just fix the problem this time. We did that two years ago. We fixed the causes of the problem, and that is something that is totally different. These problems will not occur again.

The third thing that is different is that we now have a very closely spaced set of milestones that we will manage, too, and we did not have those two years ago. We have so much more today than we had two years ago, and that is the reason I can speak with such confidence about the new schedule that we are now on, committed to Seattle in October of 1996.

Mr. DUNCAN. You say that you speak with confidence and yet the GAO report says just a few lines later, several major factors have led to the current scheduling and cost problems and, most significantly, have created uncertainty over the future of the project.

But you don't feel that same uncertainty?

Mr. DEL BALZO. I do not today, and I would be interested in GAO's reaction, based on the testimony that we provided today and the changes that we have instituted. I think I would raise an eyebrow if GAO's reaction today is exactly the same as the reaction you just quoted. I hope it is different.

Mr. DUNCAN. Thank you very much.

Mr. OBERSTAR. Speaking of schedules, we have blown ours—at least the one announced by the Chair at the outset—of hearing two panels this morning. But I think the substance merited the longer period of inquiry here with this panel.

I have two more points that I want to explore very briefly. The system, as planned, is designed to operate or expected to operate at peak performance level at an en-route center in a configuration of 210 sectors.

Mr. DEL BALZO. Yes, sir.

Mr. OBERSTAR. The 210-sector configuration was envisioned for a fully consolidated system.

Is it FAA's plan to fully consolidate en-route centers, and if so, do we need to build a system to meet that level of performance?

Is it wise to fully consolidate en-route centers or should there be a more distributed system?

Mr. DEL BALZO. Mr. Chairman, we have evaluated three different consolidation scenarios. One is maximum consolidation into 23 area control centers; a second was a more modest consolidation approach, where we would be consolidated into 53 area control centers and a number of other smaller facilities; and then an option that said we would only consolidate where it would make operational sense, which would have us consolidating into providing automation equipment to our existing 22 air traffic control centers, consolidating 30-some-odd TRACONs into as many as nine or ten TRACONs, and leaving 170 stand-alone TRACONs, such as the one in Norfolk. We have continued the analysis of those three options and are presently scheduling a review of those options with the Secretary of Transportation, to be discussed with OMB. We will then come to Congress with our final recommendation.

We hope we can make a final recommendation to the Congress prior to the end of April of this year.

Mr. OBERSTAR. Could we have a midterm review with you at that point, on an informal basis?

Mr. DEL BALZO. Surely. Yes, sir.

Mr. OBERSTAR. We would very much would like to do so.

Mr. DEL BALZO. We would be happy to do that.

Mr. OBERSTAR. The review that we had of the operational demonstration units last week out in Gaithersburg, it gives me some concern that some aspects of the new sector suite may be more labor intensive or at least more so than intended. The controller under the current system now only needs to spin the knob to establish a vector line for an aircraft. The new system is going to require keystrokes; 16 keystrokes to establish a vector line would take a controller's eye away from the scope.

Does either one of you want to address the merits of one over the other?

Mr. EBKER. I am not in a position personally to compare the old system with the new system. I would just say that we have had some of the best human-factor engineers that money can buy working on the problem. I think the problem is easier, but I am really not familiar with the specific example you use.

Mr. DEL BALZO. I don't know what controller reaction has been. I don't know if there were air traffic controllers at the facility the day you were there and whether or not you got a reaction from them.

Mr. OBERSTAR. They weren't working controllers. They were some folks who have controlled some traffic in the past. That's a bit of concern I had, and I think controllers will raise that question later on. I would like you to address it.

[Subsequent to the hearing, the following was received from Mr. Ebker:]

IBM International Business Machines Corporation

Office of the Chairman and Chief Executive Officer
Federal Systems Company

6600 Rockledge Drive, Bethesda, MD 20817

March 24, 1993

The Honorable James L. Oberstar
2209 Rayburn House Office Bldg.
Washington, DC 20515-2308

Dear Congressman Oberstar:

In the Aviation Subcommittee hearings, you asked about the number of keystrokes required to change the length of the track vector on the ISSS system versus the current system. Your data suggested it would require 16 keystrokes.

The ISSS has five different user options to perform this function. They require:
16 keystrokes
13 keystrokes
6 keystrokes
2 methods (2 keystrokes plus trackball)

The bottom two methods are comparable to the current system. In addition, ISSS can:

- provide distance vectors (current system cannot)
- support larger number of time vector values
- selectively work with single aircraft (current system cannot)

As is often the case, data can be presented which is accurate but misrepresents the good work being accomplished.

Sincerely,

Gerald W. Ebker

Gerald W. Ebker

cc: J. M. Del Balzo

Mr. Oberstar. This will conclude our morning testimony.

Yes, I wanted to ask you about the ATA's testimony. Mr. Del Balzo. They make eight specific recommendations. I would like you to address that in writing to the committee, so we have that in the committee record for this hearing.

[Mr. Del Balzo's response to recommendations from the Air Transport Association follows:]

RESPONSE TO RECOMMENDATIONS FROM THE AIR TRANSPORT ASSOCIATION

Recommendation 1

Establish an internal advocate for the needs of the airspace users to balance these needs with the needs of the FAA organizations. A new contract between FAA and users is essential if user support for the program is to continue. FAA should work with the user community on a recurring basis, possibly quarterly, to provide regular reviews of schedule and cost milestones as well as candid advice on obstacles that are impeding timely deployment in the field.

Response

FAA agrees that a close relationship with user groups is necessary to assure that FAA programs address user needs and concerns. The R,E&D Advisory Committee, which includes representatives from the airlines, airports, and pilot associations, is an important mechanism for achieving this kind of relationship. Through this committee, we will work to receive input from our customers and report our progress.

Recommendation 2

Proceed aggressively with the Interim Sector Suite System (ISSS) as the foundation for what is to follow, freezing requirements soon, resolving remaining open issues and establishing a discipline for dealing with changes in requirements. Establish October 1996 first commissioning as a firm date.

Response

FAA is moving aggressively to implement the Initial Sector Suite System (ISSS). We are committed to having the system operational in Seattle in October 1996. With two exceptions, all open issues have been resolved. These two requirements were frozen on April 1, and a new process is in place for dealing with requirements changes.

Recommendation 3

Decide soon on FAA facility consolidation. If the development and implementation of AAS is to proceed sensibly, it is essential that the long delayed decision on FAA facility consolidation be made rapidly. Additional uncertainty, costs, and delays must be expected if the consolidation decisions are further delayed.

②

Response

FAA anticipates that a decision on facility consolidation will be made by the end of the summer so that the agency will be able to specify its air traffic control system needs during FY 94.

Recommendation 4

Pursue aggressively the early implementation of the Automated Enroute Air Traffic Control System (AERA) functions and introduce the capability in Seattle immediately after commissioning of ISSS in order to provide valuable benefits to airspace users.

Response

FAA is aggressively pursuing implementation of AERA at the earliest time feasible. Studies are now underway, and we expect to have a plan and a program manager in place later this summer to carry out early AERA implementation.

Recommendation 5

Proceed rapidly with the development of the Terminal Advanced Automation System (TAAS) as the appropriate system evolution for major terminals (TRACONs).

Response

The FAA has put in place a program manager for Terminal Automation. TAAS is scheduled to be operational at the first site in 1997. We are performing feasibility studies in our systems engineering organization to possibly accelerate that schedule.

Recommendation 6

Move rapidly to system decisions with respect to the right solution for smaller TRACONs, recognizing the benefits of using the already written TAAS software and AAS contractual arrangements for these systems.

Response

Automation of smaller TRACONs is an issue being considered in conjunction with facility consolidation alternatives. We are interested in the benefits of using AAS hardware and software, and those alternatives containing AAS equipment are viewed very favorably.

③

Recommendation 7

Pursue aggressively early implementation of the Terminal Area Traffic Control System, starting with the Center TRACON Automation System (CTAS). Initial CTAS applications should be on existing ARTS-III systems at facilities with digital displays and their enroute facility counterparts. Plan on the earliest possible national implementation of TATCA capabilities (and related airport surface automation capabilities) on the TAAS.

Response

A very high priority of the FAA program manager for terminal automation is the earliest possible implementation of TATCA capabilities in TAAS. Our strategic plan for AAS will feature this capability, and we expect the plan to be available late this summer.

Recommendation 8

Review, and reach decisions within 12 months, as to whether the Area Control Computer Complex (ACCC) and the Tower Control Computer Complex (TCCC) are still the best solutions. As needed, modify the system architecture to encompass the new requirements.

Response

Our strategic plan for AAS will cover all segments of automation - terminal, tower and en route. It will be available by the end of the summer, and will be modified if necessary to accommodate the FY 94 air traffic control automation activities.

Mr. OBERSTAR. This was very good testimony. Very candid, very honest, an honest admission on the part of both parties to past shortcomings, a realistic and not overly optimistic assessment of where we go from here for the future. Fresh willingness to share information, not only with this committee but with the Secretary of Transportation.

I particularly liked the approach when Mr. Ebker said—referenced early on—in the past, we had contractors talking to contractors, lawyers talking to lawyers, now we are going to have systems managers talking to systems managers and working this out at the operational level; and that is good.

I see a setting of realistic requirements that can be met by the technology at hand. I hope that there will be some checks and balances also here—IBM saying to FAA, this new requirement or this additional requirement that you have or that has been developed is wonderful, but it is going to be extremely difficult to achieve it.

You have to be a guardian of expectations, as it were; and not just, FAA is asking for it and let's go ahead and work on it; it takes six months, and find out it is going to cost X more or didn't work the way anticipated. Those are the kind of things that have crept into this in the past and, hopefully, will not creep in in the future. You have a commitment from both sides to adhere to a fixed schedule and make whatever effort it takes to stick to that schedule.

That is very encouraging, a real personal and organizational commitment to make this system work, to deliver that first sector suite out in Seattle; and a long way to fix the problems. Those are good.

You have to recognize there is a skeptical Congress, as you have heard from my colleagues on this committee. People are expecting Congress to do better and government to do better in delivering services to the public. This is one of the most important services. People don't see all of this; it would probably scare the hell out of an air traveler to walk into an en-route center and see all the stuff that goes on in there.

They don't have to know that. The only way it affects them is when their flight doesn't arrive and they are stuck in a holding pattern, or when they are told there isn't enough capacity at this airport to get us down or when near-midair collisions begin to rise again. God forbid that they should.

They shouldn't have to know. It is our business to know it, your business to know it, to deliver the system that will be the state of the art.

You have enormous responsibility, both of you, to deliver the very best technology that the minds of engineers and scientists can produce. We are now ahead of the state of the art of the rest of the world. They are looking to us to see where America goes with this technology. By "they," I mean the Pacific Rim. By "they," I mean air traffic control, EuroControl in Europe.

I, just a few weeks ago, had a meeting with the director, as you did, Mr. Del Balzo, director of civil aviation in France. I asked him what EuroControl is doing about modernizing the air traffic control system. They said, we are watching the United States to see what you do with yours.

I can't go to conferences—I did go to Munich in this case in 1989—and speak to European authorities and tell them that we can't envision liberalizing air rights, aviation trade rights in Europe—in the United States unless you in Europe bring your air traffic control system up to the capability of ours.

I can't see why we should put you, your aircraft, your competitors in our $31 billion modernization system when you are proportionately speaking back in the Middle Ages of air traffic control. I can't tell them at this point, do as the United States did, cut all this stuff out, contract with IBM, buy the system that we are buying, and our aircraft can have confidence when they travel in your airspace that they will be operating with the same level of efficiency.

I can't tell them that until this system is delivered. I did that once, can't do it again. A lot is riding on what you two gentlemen and your two organizations accomplish. I will give you my confidence now that I think you are on the right track. Stay on it.

Subcommittee will reconvene at approximately 1:30.

[Whereupon, at 12:40 p.m., the subcommittee recessed, to reconvene at 1:30 p.m., the same day.]

[Subsequent to the hearing, the following was received from Mr. Del Balzo:]

U.S. Department
of Transportation

**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

April 21, 1993

The Honorable James L. Oberstar
Chairman, Aviation Subcommittee
House Public Works Committee
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

As a result of the hearing that was held last month before the Aviation Subcommittee of the House Public Works Committee, the Federal Aviation Administration (FAA) made a commitment to provide you with periodic updates on the status of our Advanced Automation System (AAS) program.

I am pleased that our first report to you is a positive one.

The Initial Sector Suite System (ISSS) milestone (Checkpoint #1) planned for April 19, 1993, was officially completed on April 9, ten days ahead of schedule. This milestone included two major aspects: system checkpoints and functional checkpoints. The system level checkpoint was conducted to gain insight into the ISSS in terms of air traffic control functionality, performance, and stability. Three categories of test scenarios (current host computer system functionality, background air traffic and system stability) were executed on a 28-common-console configuration for durations of up to 6 hours. All required tests were successfully completed.

The functional aspects of Checkpoint #1 included the demonstration of 135 air traffic control commands (i.e. radar, flight data processing) that will be used by air traffic controllers. Many of the commands were not due to be demonstrated until later checkpoints but were successfully integrated early and, therefore, included in the Checkpoint #1 tests.

The second major function to be demonstrated was the Enhanced Direct Radar Channel (EDARC). This parallel system is used by controllers in the event of a host computer system failure.

We are very pleased with the results of Checkpoint #1 as this accomplishment is considered crucial to an operationally suitable air traffic control system.

Over the next several months, we have a number of other key milestones that we will be concentrating on. We will report to the Aviation Subcommittee on the progress of these. I am enclosing a list of these milestones so that you can continue to mark our progress toward the successful implementation of ISSS.

I look forward to our continued work together on this and other critical FAA programs.

Sincerely,

Joe

Joseph M. Del Balzo
Acting Administrator

Enclosure

Upcoming ISSS Milestones

6/28/93	System Checkpoint #2	36 Common Consoles running for 13 hours
9/1/93	System Checkpoint #3	43 Common Consoles running for 25 hours
10/1/93	System Checkpoint #3E	Same tests as Checkpoint #3 but with technology upgrade: "Eagle" processors in common consoles (instead of current RISC 6000)
9/14-16/93	Site Survey -- Seattle ARTCC	

Mr. OBERSTAR. The Subcommittee on Aviation will come to order and resume its sitting with our first panel this afternoon, with apologies for this delay engendered by an unexpected vote.

Our next panel is the General Accounting Office. Mr. Li, we look forward to your testimony. Thank you for being with us.

TESTIMONY OF ALLEN LI, ASSOCIATE DIRECTOR, TRANSPORTATION ISSUES RESOURCE, COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION, U.S. GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY BOB LEVIN, BOB WORSTER, AND PETE MARISTCH

Mr. LI. Thank you, Mr. Chairman. We are pleased to testify on FAA's Advanced Automation System. With me today are Bob Levin and Bob Wurster of our Washington office and Pete Maristch, who is on site at FAA's Technical Center.

Using our prepared statement as a backdrop, I will tailor our statement to address some of the key points brought up this morning. I request that our entire statement be entered into the record.

Mr. OBERSTAR. Without objection so ordered.

Mr. LI. I listened attentively to you, the Members, IBM and FAA this morning. I believe this hearing is indeed a wake-up call. Three major points are worthy of emphasis, namely that, one, AAS costs are indeed growing, two, reasons for ISSS problems need to be monitored to assess the adequacy of corrective actions; and three, longer term actions are needed beyond just correcting ISSS.

First, the issue of growing costs. Since 1983, the estimated costs of the AAS has doubled. The current estimate is $5.1 billion. The agency has identified $235 million in additional contract cost growth that may eventually have to be added to the $5.1 million estimate. That is the agency's estimate.

AAS schedule delays, three years from the milestones established in 1988, have cost ramifications. These delays caused FAA to implement or consider several costly interim projects. For example, it initiated a $435 million project to bridge the gap between current and future air traffic control systems at terminal facilities.

In addition, FAA has tentative plans for projects to sustain its en route centers until ISSS is installed. These would cost over $200 million. None of these costs are reflected in FAA's official cost estimate for AAS.

My second point addresses the reasons behind the current situation. Ensuring that proper corrective actions are taken requires a good understanding of what caused the problems in the first place.

In our opinion, current AAS problems and future project uncertainties can be attributed to several factors. One key factor is that FAA and IBM significantly underestimated the effort required to develop and implement AAS. We heard that this morning. As a result of their misjudgment, they set schedules which later proved to be unrealistic.

The schedules were overtaken by factors such as open requirements, design changes, and software rework. As a result, several technical problems remain for ISSS. For instance, automation of existing paper flight strips is an unresolved problem.

Flight strips, as we spoke about this morning, contain information about flight location, altitude, direction, speed, and destinations. Controllers currently write on the strip to reflect changes in this information and to record instructions given to pilots. Electronic flight strips, as currently designed, have been judged by controllers as operationally unsuitable. They require too many operator key strokes and do not adequately display information. FAA has not yet solidified the changes it believes are necessary to make flight strips suitable.

Another major cause of ISSS problems is that FAA did not provide adequate oversight. As recently as last summer, FAA and IBM indicated that they were making good progress because over 95 percent of the software for ISSS was written.

However, this proved to be a poor indicator of progress because testing of key functions was deferred. As of today, FAA has a very limited capability for providing information on the real progress of software development.

Another reason for AAS problems is FAA's failure to resolve key requirements issues. This has contributed to problems in developing AAS and to the uncertainty over the project's future. According to IBM officials, the lack of clarity and decisiveness by FAA in resolving requirements has contributed to AAS schedule and performance problems. Most requirements should be resolved before development begins. This was not always the case.

In addition, FAA has been indecisive in how it will consolidate en route and terminal facilities scattered throughout the country. Until this decision is made, the AAS project office cannot determine how many facilities will receive AAS equipment, how much equipment is needed and what capability will be required of that equipment.

FAA's original plan was to consolidate over 200 facilities into just 23. The agency is now leaning towards a limited consolidation plan. This new plan would represent a major departure from FAA's original intentions. FAA has not yet delivered a facility consolidation plan to the Congress despite direction to do so by February of 1992. That is one year ago.

We believe that the rapid turnover in administrators and acting administrators at FAA, nine over the past 10 years, has contributed to the lack of resolution of this issue. Many of these causes I just mentioned were also identified by the Volpe National Transportation Systems Center as the Chairman alluded to this morning.

At the direction of Congress, FAA tasked the Volpe Center to assess the status and technical risk associated with the AAS software development. We find that FAA has made some progress in implementing recommendations from the Volpe Center report, but more needs to be done.

Overall, more than half of the 74 recommendations have been closed. The Volpe Center report highlighted three key areas. First, problems in developing AAS must be understood by higher management levels. This ties to our point about the need for better oversight.

On the positive side, FAA has decided that its top level Acquisition Review Council will be receiving progress reports every two weeks. We are concerned, however, about whether top management will have accurate, useful information for tracking progress. We found that FAA is only beginning to make inroads in improving its capability for reviewing IBM's progress and software development.

Second, the Volpe report stated that AAS requirements must be frozen. We believe FAA and IBM have been making good progress on resolving requirements issues and have in place a decision structure to address new issues as they come up.

Specifically, FAA has designated top officials in its air traffic and airways facilities organization to work with the AAS program manager. Also, any issues that could impact on project costs or schedule will be reviewed by the Acquisition Review Council.

Third, the Volpe report emphasized that the AAS schedule must reflect reality, providing sufficient time for development and testing.

FAA and IBM top management are very committed to meeting the new schedule. However, we would have to look very carefully at how this new schedule was derived before rendering a judgment about how realistic that schedule is.

My final and third point is the urgent need to address longer term issues concerning AAS. Given problems experienced over the past five years and likely changes in FAA's consolidation plan, FAA faces two different types of challenges. The first challenge is addressing immediate schedule and technical problems, and the second challenge is determining whether the plan for each segment of AAS is the most appropriate way to meet the needs of the air traffic control system.

We believe the corrective actions announced so far by FAA and IBM are generally responsive to Volpe's recommendations. These actions should help put ISSS on track. In the longer term, however, the critical issue is whether subsequent segments are still the most cost-effective approaches.

Over the past few months, FAA has been reviewing its plans for AAS. In addition, the Secretary of Transportation is now considering an assessment of the AAS project. In our view, any new strategy for AAS would be most effective if it contained the following four elements.

One, establishing realistic schedules; two, reaching more timely closure of requirements; three, submitting a firm consolidation plan; and four, critically evaluating the current plan and need for each AAS segment.

To make decisions on AAS, the Department and FAA will need information on the costs, schedules, benefits, and risks of each segment. The forthcoming Volpe cost benefit report on AAS that Mr. Del Balzo referred to this morning will provide much of this necessary data.

In conclusion, there is no doubt that the AAS project is a very complex undertaking. Given its substantial complexity and cost, we believe that FAA management must exercise closer supervision of IBM's progress and address schedule and technical problems in a more timely way. FAA must also deal decisively with its changing requirements. Recently announced management initiatives must be carried through to minimize further schedule and cost problems.

This concludes my statement. I would be happy to answer any questions at this time.

Mr. OBERSTAR. Thank you very much, Mr. Li. We greatly appreciate your further review of the AAS contract and the progress on it or lack thereof and the problems in the system.

You heard the testimony this morning. You were sitting through it all. Are you persuaded that both FAA and IBM now have in place systems and personnel to keep the program on schedule and meeting realistic program requirements that can be responded to by available technology? That is two questions but in one.

Mr. LI. Addressing the issue on whether or not we feel that the schedule will be met and whether or not it is realistic, I believe that IBM and FAA are committed. We have met with Mr. Del Balzo and Mr. Ebker, and as far as their word on whether or not they are going to meet the schedule and the progress, they have given us their assurance.

Mr. OBERSTAR. Their word is not in question. They are people of impeccable personal integrity. Is their word justified by the systems put in place and the personnel put in those positions?

Mr. LI. The personnel changes and detailed schedules, which I would need to look at in order to come up with a positive response for you, are not yet available. We were not made aware of these changes until last week, so it is too early to tell right now. I cannot make that commitment. However, I am encouraged by what they have said.

Mr. OBERSTAR. You will continue to monitor this contract? You'll continue to observe?

Mr. LI. Yes, sir.

Mr. OBERSTAR. Taking careful note of what was said this morning, I would encourage you to follow closely and follow the usual procedure that GAO does in reporting to FAA and your observations, and also come back to the committee so that on both sides of the aisle we can evaluate further this matter from GAO perspective.

I must say, I like what I am hearing. There's a more realistic tone and content to what both sides are saying, developing requirements that each side is certain can be met by the technology, developing schedules by which you can achieve those objectives and which also permit measurement of progress. They have made personnel changes that should allow for a fresh look and a new sense of mission on both parts.

And there is also the straight lining within the FAA, the ability to report directly to the acting administrator. You need to evaluate what that means in terms of the problems facing this contract.

Mr. LI. Mr. Chairman, last year in the hearing on the F&E reauthorization, I remember you raised some concern about how FAA was managing the VSCS contract which was also a very large contract. And at that point in time, you raised a concern about the FAA Administrators involvement and made mention of the fact that he had to bring the presidents of both competing contractors together. It was only through that process that they were able to resolve problems of non-performance.

And as I recall, your concern was, does this have to happen each time you have a problem? Does the Administrator have to get involved? I believe this morning as I listened to you, sir, I got the same sort of feeling that this was still your concern.

Our position is that indeed there needs to be an institutional process put in place that "top management" does not need to be involved to that degreel. So based on my recollection of your comments this morning, I wanted to add that point.

Mr. OBERSTAR. You have a very good memory and a very good insight into our concerns and why we think there needs to be constant monitoring, reporting, and deadlines. And maybe as Chairman Mineta suggested this morning, we need a kind of report card, a progress report card and we may have to institute such.

The Volpe Center recommendations document, which is a certainly very interesting and analytical piece produced a year ago, made some very detailed and useful suggestions, recommendations, about software development and how that development should be managed. How has FAA responded?

I asked Mr. Del Balzo what they have done and expressed my dismay that we were not able to obtain a copy of that document in timely fashion for the subcommittee to evaluate and presumably also for GAO to evaluate. Now that there is time, what do you think?

Mr. LI. Mr. Chairman, we have read the report and, as I said in our statement today, more than half of the 74 recommendations made in the report have been closed by FAA. That is FAA's own accounting. They do have a process, Mr. Chairman, by which they are keeping track of each one of those recommendations and what the status is. Mr. Levin has more details on that issue.

Mr. LEVIN. Allen, I would like to add a general comment which is that we have perceived a greater sense of urgency since the November 30th cure letter came out toward those Volpe recommendations. Before that, we got a real sense that the Volpe recommendations were, okay, kind of interesting, but they didn't have a real sense that they had to jump right on them. I think once it became clear to them that the program was really suffering some severe problems and they had to do something, then they took it a lot more seriously.

You said earlier that there was a sense of shock on the part of General Richards. It is true in IBM as well. If they had read the Volpe report in April very carefully, they would have known that top management doesn't really have a way of keeping score, of knowing if there are really serious problems or not.

And we are really not convinced they still have, Mr. Chairman, that they have a means right now of tracking progress in terms of how much functionality is being successfully built into the system. I don't know if Pete or Bob want to supplement that answer.

Mr. OBERSTAR. Yes?

Mr. WURSTER. I think over the last few weeks we have seen some additional movement on some of the issues. One of the Volpe recommendations was to put a program manager and a team on site at IBM and FAA. As of about a month, month and a half ago, I don't think FAA saw a need to do that. Now they will put an ISSS program manager along with some operational people at IBM.

But as Mr. Levin said, we still don't feel that anyone has a good system in place to assess how much progress IBM is making; essentially how they are going to assess whether the schedules will be met over the next few months and the next three years.

Mr. LEVIN. Mr. Oberstar, you were in IBM's war room and we were there and they had streams of and piles of papers all over the walls. And I defy anyone, any one individual, to say what this all means in one paragraph. I really wonder what the Administrator is going to hear when he sits down and gets briefed every other week. What are they going to tell him? Are they going to trot out all that paper or try something simpler so one can capture what's happening with the program.

Mr. OBERSTAR. Well, yes, maybe a simple flow chart of progress. I remember very well the report that GAO did in 1986 on the Host system in which I cited in my opening comments today, IBM started out with 80,000 lines of code and wound up with 130,000 plus lines of code, a 62 percent increase, 265 open items at one point. But they were able to come to closure on those with only roughly a six-month delay on the contract.

Now we are talking about a system that is 10 times that size and one which they try to manage as one huge system instead of breaking it down into its complement pieces which they have done now. I keep harping about lessons learned, what can you learn from Host that you can and should apply to AAS. And some of these items are the things that you are citing and should have been applied.

So perhaps this idea of a flow chart is necessary to give us an opportunity to give them an opportunity to measure words, intentions against deeds.

Mr. Clinger?

Mr. CLINGER. Thank you very much, Mr. Chairman.

As you have indicated, we intend to monitor this situation very carefully on a month-to-month basis. And I think that would be very helpful as well to have that kind of information available to us as we go down the road because I think all of us are determined that what has gone on in the past, is not going to be replicated. We want to make sure that that is not going to be repeated.

We have the testimony from Mr. Del Balzo this morning, basically, of the delays that were involved here that he said probably FAA was responsible for about five months of that delay and that IBM was responsible for about 14 months of the delay. Would you agree with that assessment and were there other factors that entered into this?

What about the Hughes appeal? Did that slow down the process? Were there other things?

Mr. LI. My recollection, Mr. Clinger, was that the original award was made in August, and in October the protest was resolved, so there was a three-month delay in IBM getting up to speed. My recollection also is that FAA and IBM admitted to the 19-month delay breakdown in terms of—approximately 60 to 66 percent was due to IBM's problems, and the remainder was due to FAA. So that was roughly the magnitude.

Mr. CLINGER. So I think we all agree there is plenty of blame to go around here and we all have a share in that. I guess maybe you have testified to this.

Have you been able to review the agreement that came as a result of the cure letter. I guess you were talking about that when

I came in, and if so, do you think that what they have agreed to is going to be sufficient to address the problems that we have seen?

Mr. LI. Mr. Clinger, last week was the first time that we were formally briefed on their changes at a very high level. We have not been provided the details concerning how they will make these changes. We would, as a result of the work we are doing for another committee, be continuing to review that.

Mr. CLINGER. In your statement, you note that FAA spent about $700 million during the competitive design phase of AAS. Would you consider that a reasonable amount for a project that was then projected to cost $2.5 billion? Does that ratio seem right?

Mr. LI. I don't know what I would compare that with the $2.5 billion estimate; however, it does seem like a lot of money. $700 million is not a small sum. That was more money than was spent on the Host, for example, and that is my frame of reference. There were prototypes to be built out of the design competition phase of AAS. Hughes and IBM were the people that were trying to compete for the AAS production contract.

One of our criticisms in the past from the design competition phase was that FAA proceeded after the design competition phase to make an award which we in our reports, had indicated to be risky in terms of the procurement strategy.

What had happened, Mr. Clinger, was that they had produced a prototype for ISSS, and a lot of the design of AAS was not yet fixed and they didn't know much about the specific details. They had an overall concept. ISSS was built as a prototype. And the purpose of the design competition phase was to establish who was most capable of proceeding into the production phase.

One of the issues brought up this morning was on procurement regulations and design competition phase. Mr. Del Balzo felt that he was comfortable with the two acquisition phases and yet there were some things he would have changed.

I think, in retrospect, when you take a look at that process, FAA's procurement stages were slightly different from what people call the A109 process. Mr. Clinger, that process is one where you go in increments and you have a go/no-go decision by top management. So you prove something and then you stop; A109 has the capability to do that.

Mr. CLINGER. One of the things I think I noted this morning was that, because they were doing all of this in a great lump sum, there was a long, long period of time when there was a black-out zone and when FAA couldn't talk to anybody and they couldn't talk to FAA. There was a total lack of basic communication because they were in a design competition phase, whereas if it was broken up into discrete segments, they could have done this and had communications periods with FAA.

You are trying to deal with a buyer who is unable to talk to you. That really makes it very difficult for you.

Mr. LI. That was one of FAA's arguments to down-select to one vendor.

Mr. CLINGER. My time is expired. Thank you very much.

Mr. COPPERSMITH. [presiding]. The gentleman from California, Mr. Horn.

Mr. HORN. Thank you very much, Mr. Chairman.

Within the General Accounting Office, as we all know, there is a collective repository of the good and the bad—usually the latter—that is carried on by Federal agencies.

And, Mr. Li, what I am interested in is how would you pull together all that experience that GAO has had in looking at the management of technological programs, especially those that involve conversions to expanded computer systems and particular Federal agencies? And what lessons can you give us that somebody right out there now in a Federal agency is trying to design how to manage some conversion effort to a more efficient, effective system?

What would you tell them as to both the customer-vendor relations, as to the management structure that they ought to have to supervise the project, provide input from all the various aspects of who is the customer in this case? Is it the public or the controllers, pilots flying the plane, whatever.

And how would you involve a grassroots effort where vendor representatives and customer representatives work much as in the demoing system on, let's say, quality control? What can you tell us?

Mr. LI. That is a tall order to answer your question, Mr. Horn. Let me try and attempt to answer in this way. I believe that GAO, throughout the years, has indeed looked at many large acquisitions. One lesson learned from the acquisition process is that your definition of requirements has to be set. There is no sense asking a vendor to design a system if you don't really know what you want.

And while some people might disagree and say, well, FAA did indeed have those specifications, it appears that some of the basic things in terms of an operational concept were not developed by FAA before they went and jumped into this. So that would be a lesson learned in terms of requirements.

Mr. LEVIN. Can I interject here, Allen? I would add that getting the customers buy-in at the earliest stages here is critical. And it is pretty clear to us that more could have been done in that regard by FAA, getting air traffic and airway facilities buy-in back when the critical design review is being done.

Mr. WURSTER. I would add, it helps to have prototyping, even if not a full system. It would have been great for FAA if they had a demonstration facility like they do now out in Gaithersburg three, four, five years ago; they would have uncovered a lot of these problems a earlier and had IBM working on them.

Mr. HORN. That is a difficult question to develop the prototype because you are almost doing the whole thing you have to do for the full system. Isn't that the danger and can we expect a prototype on this type of technical endeavor?

Mr. LI. One of the terms that is currently used is rapid prototyping, and that is a process by which you don't develop the entire system, but you want to test and see whether or not the user indeed is receptive to some of the functions. That seems to be something that is catching on right now with many acquisitions.

To also answer your question in terms of beyond the requirements, I think there needs to be a better working relationship, obviously, between the vendor and the agency.

Many times—and I have seen many adversarial types of relationships—I believe that the new relationship that FAA and IBM have is not adversarial. I think they are trying to work on this together, so I am encouraged by that.

Mr. HORN. Any other thoughts?

Mr. LEVIN. I think one of the key things that GAO has said before is that top management has to know what's going on and have tracking systems in place to make sure that risks are being managed and cost estimates and schedules are being adhered to. And that was definitely a lesson learned in the case of AAS.

Mr. HORN. Does this essentially mean that, instead of thinking that the overall agency administrator is going to solve the problem, there would be one person pinned with the responsibility that directly reports to the Administrator on a project basis of this magnitude who has his or her authority to pull together all aspects of the agency related to that and can monitor the program from day one and pre-day one in terms of the implementation?

Mr. LI. Mr. Horn, I believe that FAA is moving in that direction. Admiral Busey who was the previous administrator before Mr. Richards, and his staff had started to implement what we call acquisition reform. One of the positive sides of that particular reform was to establish people who were more accountable for their own programs. We saw that as a very encouraging thing.

Mr. HORN. One last point, Mr. Chairman, and that is to what degree if any do the present procurement regulations of the Federal Government, usually designed to protect the public interests, make sure nobody is defrauding anyone else, make sure GAO is not crawling all over the agency for violation of this and that?

People run scared. To what degree are those regulations impeding sensible contracting which might save the taxpayers money if they didn't have to justify every penny by 10 cents worth of auditing effort and pre-auditing effort?

Mr. LI. Our view, Mr. Horn, is on the majority of all the projects that we have reviewed in FAA's modernization plan, that those procurement regulations have not been the reason there have been delays. If anything, it has been the lack of implementation of some of those risk mitigation regulations. My personal belief is that those processes are in place to try to protect the taxpayer, as you have said, and try to minimize the risk. So I personally do not feel that current procurement regulations have been the cause of problems that FAA has had.

Mr. HORN. FAA, it does not seem they want to admit they have made a mistake in not seeking full flexibility in that.

Mr. COPPERSMITH. I would like to recognize the patient gentleman from Florida, Mr. Mica, at this time.

Mr. MICA. Thank you, Mr. Chairman. Just a couple of questions.

This perhaps, I guess, is now double in cost from the original cost estimates and now there is a 14-month anticipated delay. What do you think the final figure will be? We are up to 5.1 billion. What do you think this will cost?

Mr. LI. Sir, I don't have that crystal ball and I wish I had.

Mr. MICA. I heard a figure of 6 percent?

Mr. LI. We had identified at the agency an additional $235 million in cost growth on top of that $5.1 billion at the present time. I believe that as FAA develops more software, we will find additional problems. I think that Mr. Del Balzo has pretty much said not to expect this to be trouble free. We will probably hit more problems.

Mr. MICA. I am not here to assess blame or responsibility, but just sort of for the record or for our information, if you were assigning responsibility for the delay to FAA versus the contractor on a 100 percent base, is it 50/50?

Mr. LI. I am afraid I don't have the details.

Mr. MICA. Should I pose that to you in a question for GAO?

Mr. LI. We will try to respond to that.

[The following was received from Mr. Li:]

On the 19-month AAS delay announced in December 1990, FAA attributed 5 months to its changes in system requirements and 14 months to IBM's underestimation of the effort necessary to produce AAS software. We believe that FAA must share in this underestimation since it accepted IBM's proposed schedule when the contract was signed. Regarding the recently announced 14-month delay in ISSS, FAA and IBM must again share responsibility. IBM missed established schedules and has not met requirements. In other cases, FAA has been slow in clarifying its requirements for ISSS. What is most important at this time is that both FAA and IBM address their problems as spelled out in the Volpe Center and in our testimony at this hearing.

Mr. COPPERSMITH. On pages 7 and 8 of the testimony, you discuss additional plans by the FAA for 3 projects to sustain the on-route centers.

Two questions: Generally, can you provide more detail on these temporary projects, and second, this idea of bridging the gap until the AAS comes on line—I think you have identified $200 million of interim projects of stop-gap measures—what are these measures and is there an effort to allow for their integration into AAS or is this basically additional expense that we will have to tack on to the final figure?

Mr. LI. I believe they are additional things and do not belong to AAS.

Mr. WURSTER. They are not in the $5.1 billion or the extra $235 million in AAS cost growth. But essentially they are costs of delays in AAS—things being put in over the next 5 or 6 years that will be replaced by later AAS phases.

One is about $135 million to replace the DARC system, the backup for the host computer. There is $45 million for display channels, which is the system that supports the controller screens that are out there right now, $45 million for 8 out of 20 centers, and there is another $35 million for a training system that will allow FAA to free up some controller consoles. Right now they are getting to where they are going to have a shortage of old consoles that have been out there for 20 or so years. All told, it is about $230 million for those 3 projects.

[The following was received from Mr. Li:]

FAA cost estimates and the expected fiscal year (FY) these projects will start is as follows:

(1) $135 million for the direct access radar channel (DARC) replacement—FY 95;
(2) $45 million for display channel computer replacement (DCCR)—FY 94; and
(3) $35 million for the enhanced stand-alone radar training system (ESARTS)—FY 94.

In total these three projects are estimated to cost $216 million

Mr. COPPERSMITH. Are they going to be able to be fit into the system or are these basically going to be Band-Aids?

Mr. LI. They will be thrown out when the new system is up and running.

Mr. COPPERSMITH. These are additional costs that will be and have been imposed in addition to the costs that directly relate to development of the project.

Mr. LI. Yes.

Mr. COPPERSMITH. Is that the $235 million figure referred to on page 1?

Mr. WURSTER. That is separate; a coincidence.

Mr. COPPERSMITH. We have two 235 millions we need to keep in mind here. Can you give us some sense of how the contract now with IBM works in terms of incentives and penalties regarding the new milestones, the new work performance, fixed-price and cost-plus features? Do you have an opinion on the current structure of the contract and whether it is adequately structured?

Mr. WURSTER. We haven't looked into the incentives and penalties. What we do know about this contract, it is a mixture of seven or eight kinds of line items, including cost plus, cost-plus fee, fixed-price incentive fee.

We don't have an opinion at this time. We would have to do additional work to look into that.

Mr. LI. In general, the hardware is under a fixed-price contract. The software for most segments is being developed under a cost-plus arrangement.

Mr. COPPERSMITH. Do you have any plans to examine the contracts for those kinds of issues?

Mr. LI. Not currently.

Mr. COPPERSMITH. I think my brief moment in the sun is about to end.

Mr. Clinger, do you have additional questions?

Mr. CLINGER. No further questions. I commend you on your tour of duty.

Mr. OBERSTAR. Mr. Li, you have reviewed FAA's performance. What have you done with respect to IBM's performance? Have you analyzed whether they have met expectations under this contract and how, and if not, in what ways?

Mr. LI. I think IBM, on their performance, was straight with you this morning in that they admitted they did not have enough oversight of what they were trying to provide.

One of the remarks that we have made looking at DoD acquisitions was the cultural aspect of why we are having these problems with cost delay, cost increases and schedule delays.

It appears there is comparability with the situation here with IBM and FAA. I believe that the people that are at the working level probably had a good idea of some of these problems. There was just not a good process—the culture did not permit going up the chain and admitting that something was going wrong.

The schedule was the driving force. Everybody had a "can do" attitude. We want to make the schedule and yet at the 11th hour when they couldn't make it, they had to admit that they couldn't. I think that is part of the whole acquisition culture.

Mr. OBERSTAR. That comes in the category of what I call lessons learned from the past that should have been applied to this contract.

What is important in addition to seeing that this contract under current agreements and understandings stays on track and meets schedules and produces the product, is that the lessons learned from this experience be applied to other elements of the NAS plan.

Mr. LI. I agree, Mr. Chairman.

Mr. OBERSTAR. GAO is very good at doing this kind of analysis and at pointing out what went wrong, how it was fixed and how it should be fixed for the future. I recall very careful analysis GAO did, or for want of a better term, the Chrysler bailing out. It analyzed how the Congress, the Executive Branch, both went about it, the elements; what worked, what didn't work, and if ever again if Congress were to consider such an undertaking, there were guidelines set forth and GAO drew lessons from the New York City bailout and from a couple of other similar big system involvement by the Federal Government.

This is an important opportunity for us not to wait until 1995, but soon after April. It would be good to get together with you and establish some benchmarks so that when people move from the scene there will be an institutional memory on how a system went awry, how it was fixed and how it should be done in the future.

Mr. LI. Mr. Horn asked me about lessons learned and trying to apply those with GAO having looked at many systems. One of our strengths has been able to capture many of the lessons learned in terms of acquisitions.

I have a document here called "Information Technology, an Audit Guide for Assessing Acquisition Risks." We do provide those sorts of lessons learned and we provide those to all agencies.

Mr. OBERSTAR. Thank you very much. We really appreciate your participation and your contribution today.

We have a long-awaited witness. We will call at this point out of order in the hearing schedule today, Mr. Jon Seymour, Assistant Secretary for Administration for the Department of Transportation.

We very much appreciate you being here and appreciate Secretary Pena making you available today. I think this is obviously a get-acquainted cruise for the Department with the committee. I think we have an understanding now about witnesses and when they should appear and what we expect and what we would like from you.

You do not have a prepared statement, but we would like a review of what the Department's role is in the acquisition process. Generally, how you see the role of the Department of Transportation in the future in the development of the advanced automation system, the interaction between FAA and IBM, and how the Department plans to monitor future progress and the agreements entered into in the wake of the cure orders which were enunciated today in this hearing.

I must say that one of the things that this—one of the policies this committee has been critical of in the past is micromanagement by the Department of FAA activities. So on the one hand you know we are saying we want Departmental review. We don't expect the Department to manage the contract, but to see that it is being managed properly, and that is the oversight role of the Department.

Too often we have seen Secretaries take credit for the good things going on and hands off the bad to the agency heads, not only this but other Departments, and particularly in the FAA. That has been harmful.

One of Secretary Skinner's great contributions was a commitment that he made that full contracting authority responsibility would be returned to the FAA to manage the systems that it had designed, to undertake the contracts that it had launched, or to negotiate contracts that were necessary for systems and not have this done out of the Office of the Secretary.

He stuck by his word and I think it was all to the good—until now. Now we see some problems, but the problems are on their way to being fixed.

Mr. Clinger?

Mr. CLINGER. I just would second all of your comments, Mr. Chairman. We are delighted that you could join us, Mr. Seymour. We understand that things are sparse at the Department these days and therefore we are grateful that you could come and participate. We do feel that the Department has an oversight role, if you will, in pursuing this and in making sure that we are going to stay on track now.

We up here often get accused of micromanaging things and we don't expect that you will micromanage either, but we are very concerned that this contract and what goes on from here is in fact going to result in a successful conclusion in October of 1996.

I think the Department does have a role to play. We just wanted to seek your concurrence in that, if you will, and a little explication of what you view the role as particularly in view of the cure order and where we are going to go from here.

Thank you for coming.

TESTIMONY OF JON SEYMOUR, ASSISTANT SECRETARY FOR ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION

Mr. SEYMOUR. I am pleased to be here and hopefully shed some light. It is important to start by telling you how very interested and concerned Secretary Peña is in this contract. It is something he has paid a lot of personal attention to.

Mr. Chairman, you have talked to him a couple of times about it. He has been thoroughly briefed by the FAA and continues to be briefed on the status of the contract. He envisions a role for OST in working with FAA in monitoring progress on the contract. It is something he and Joe Del Balzo and I have talked about and he intends to have a very visible role and to do everything he can to make this work.

I think it will work in the spirit of cooperation that you have talked about, where there is a partnership with the FAA and OST in an effort to move this forward. And I think there is a good partnership here.

Clearly the Secretary is interested and is determined to see this work.

In terms of the Department's role, I think as members of the committee may know and certainly our friends from GAO know we have a group called the TSARC, the Transportation Systems Acquisition Review Council, consisting of Assistant Secretaries in OST and the Modal Administrator involved with a major procurement who review the procurement from its inception through completion. Over time, that program has worked with some benefit and with some problems.

Over the last several months, we have been working with a high-level group from the Coast Guard and FAA to redo the entire major acquisition plan we have in place in the Department. It is something GAO and others have looked at, and the committee has heard about. I think we have the substance of a dynamite way to become actively involved and participate with FAA and with the Coast Guard on major acquisitions and yet not get into the position of micromanaging.

We are looking a lot more at mission need, which is articulated by the operating administration, getting the Secretary, the Deputy and senior staff involved with the operating administration agreeing from the early stages on the base lines for the procurement, and items like the exit criteria to go from one phase to the next. That is going to be done through the various phases of new contracts that come into place. What Joe Del Balzo and I have been talking about is applying the same criteria to the work FAA and IBM will be doing to bring about AAS.

I will get a briefing with Joe and others on Monday about status of negotiations with IBM and Joe Del Balzo and Monte Belger and we will be working with the Secretary to come up with base line criteria where the Secretary will be able to see what is expected and have early warnings if things aren't going as expected.

Over the last several years the way we have worked with administrations on major procurements is to have someone from the Office of the Secretary attend briefings. Periodically I would go as well as other Assistant Secretaries to get briefings, but it was from an agenda that the administration—in this case the FAA—had put together. Briefings were not based on a predetermined set of agreements about where you expect to be three or four years down the line.

So I think this base line and the Secretary's personal interest will put us in a good position to work with the FAA on this contract.

Mr. OBERSTAR. What is the role of the TRW Group in this process and how do you understand their role to interact with FAA and with IBM and with the Office of the Secretary?

Mr. SEYMOUR. They are the support contractor to FAA versus the work that the SEI Martin Marietta was doing. They are also doing that as well as software reviews for FAA.

I don't have the results of some of the initial actions taken. That is something that I will be working with the FAA on.

Mr. OBERSTAR. Does that mean they will have a benchmark review role or that they will be making recommendations to FAA and to the Secretary?

Mr. SEYMOUR. They are making recommendations to FAA and to the Secretary as well through the FAA on how things are going and what the benchmarks ought to be.

I am sorry I wasn't here this morning to hear Mr. Del Balzo. We have met a number of times. He is looking at benchmarks, deliverables, expectations for things to be accomplished in order to manage this contract. That is consistent with what he wants to do.

Mr. OBERSTAR. We will see that you get a copy of this morning's transcript of proceedings so you can review it. You will find it very interesting. You can be involved in the measurement of progress and establish some sort of early warning system so when you see problems developing, you will be able to deal with them at an early stage rather than a later stage.

That is what we are looking for; adherence to the understandings and agreements that have been entered into by the parties. Realistic requirements for the program must be set forth that both parties are certain can be met by technology available or to be developed and by the software being developed; we want to see adherence to a fixed schedule that both parties have agreed to. There is the April drop-dead date for that to happen. Then we will expect to have periodic briefings, perhaps monthly or more often and certainly at the moment that there is some major glitch that develops.

Mr. SEYMOUR. I think we are fortunate, sir. We have on one end your interest and the Congress' interest and the committee's interest in doing that and on the other end we have Secretary Peña every bit as interested to make this thing work and to see that base lines are established and adhered to.

You are talking to a very receptive audience, sir.

Mr. OBERSTAR. I would hope that—I have heard of bringing in additional outside review panels or blue ribbon panels or something is just talk. At this point, I don't think we need to introduce into the equation another element of review.

You have FAA and IBM. The Secretary's Office is involved heavily. TRW is reviewing it. GAO is going to be monitoring them. This committee is going to be looking over everybody's shoulder. Maybe another cook in the soup gets the broth sour.

Mr. SEYMOUR. Understood, sir.

Mr. OBERSTAR. Mr. Coppersmith?

Mr. COPPERSMITH. Thank you, Mr. Chairman.

I wanted to recount some of the chairman's advice. I think he repeated an abbreviated version. We have had a lot of enthusiasm from Secretaries of the Department of Transportation as to personal involvement in making sure that the project works, but that is really not the issue.

I think you will find it far more effective rather than concentrating the resources at the Secretarial level and in the Department in making sure that accountability and knowledge is actually pushed down as far as it can be.

I think the Secretary's job is to make sure that the people below him are doing the job. We don't expect personal involvement at that particular level. We expect more management direction so that the issues can be dealt with at the appropriate level.

Prior testimony indicated some of the problems at FAA have been because the people who knew most about the project were not in a position both in terms of where they stood in their careers as well as hierarchically in the organization to be able to provide binding answers. That may be more of a systemic issue where that sort of reform within the FAA and the Department which could stand DOT and other agencies in the government in good stead.

Mr. SEYMOUR. We want to work intelligently with the FAA in partnership to bring this off. There is no way we are going to get involved in the day-to-day issues. Technically that is something that they have to do, but mapping out and tracking schedules, considering alternative procurement strategies, where we think we have a role to play.

Mr. COPPERSMITH. And taking no prisoners.

Mr. SEYMOUR. Sometimes I think we are all prisoners.

Mr. OBERSTAR. Mr. Seymour, it is very good to have you here. This is a good start to the relationship of the Department with this committee, and we look forward to a spirit of cooperation. Certainly as the Secretary becomes more familiar with these issues, we will have him from time to time appear to talk with us about broad departmental policy.

For the moment, I thank you for being here. I thank the Secretary for making you available and we look forward to this kind of good working relationship and will expect in the future that when we call for witnesses that the Department will provide them.

Mr. SEYMOUR. I look forward to seeing you again, sir.

Thank you very much.

Mr. OBERSTAR. Our next panel consists of John Ryan, Vice President for Air Traffic Management, Air Transport Association; Mr. John W. Olcott, President National Business Aircraft Association; Mr. Steven Brown, Senior Vice President for Government and Technical Affairs, Aircraft Owners and Pilots Association; Mr. Siegbert Poritzky, Senior Vice President for Technical Affairs, Airports Council International, NA.

TESTIMONY OF JOHN R. RYAN, VICE PRESIDENT OF AIR TRAFFIC MANAGEMENT, AIR TRANSPORT ASSOCIATION COALITION; JOHN W. OLCOTT, PRESIDENT, NATIONAL BUSINESS AIRCRAFT ASSOCIATION; SIEGBERT PORITZKY, SENIOR VICE PRESIDENT FOR TECHNICAL AFFAIRS, AIRPORTS COUNCIL INTERNATIONAL, NA; AND STEVEN BROWN, SENIOR VICE PRESIDENT FOR GOVERNMENT AND TECHNICAL AFFAIRS, AIRCRAFT OWNERS AND PILOTS ASSOCIATION, ON BEHALF OF THE NATIONAL AVIATION ASSOCIATIONS COALITION

Mr. OBERSTAR. Mr. Ryan, would you proceed please.

Mr. RYAN. Yes, sir. I will read an abbreviated statement.

Mr. OBERSTAR. All witnesses' statements will appear in the record in full.

Mr. RYAN. Relative to earlier testimony today, I would like to say that ATA, the Air Transport Association of America, is definitely a user and definitely a customer.

I appreciate this opportunity to discuss ATA's views on the Federal Aviation Administration's advanced automation program. Modernization, expansion and reliable operation of the ATC system are the keys to ensuring improved levels of safety in the future as well as providing adequate aviation system capacity to meet future needs of the traveling and shipping public.

The Advanced Automation System design competition contract was awarded to IBM and Hughes in 1984. The production contract was awarded to IBM in 1988, four years later. The cost of the design competition phase of AAS was about $450 million. Design competition has not been an effective tool for FAA procurement of major systems.

FAA spent $80 million in design competition for the host computer contract. The production award for the host computer was $191 million. Since the contract called for off-the-shelf equipment, the host contract should not have gone through the design competition phase. What is more, GAO recommended FAA continue the host design competition for another year, which would have cost another $40 million and further delayed implementation of the host computer system.

Fortunately, FAA resisted the GAO recommendation and awarded the contract holding the design competition costs to $80 million rather than $120 million. It still took FAA seven years from inception to last site implementation to complete the host program.

In December 1990, IBM and FAA announced a 19-month slip in the AAS program schedule. The slip was due to additional requirements and the realization that the original schedule was unrealistic. The airline industry is appalled at the recent reports of another 14-month delay and of the FAA's continuing failure to field the advanced automation system on schedule.

Completion of all phases of the advanced automation program has altogether been delayed from 1996 to 2002 and has increased in cost from $2.5 billion to about $5 billion. Mr. Chairman, it is important to note at this point that if the AAS program reaches its final conclusion as originally planned, it will have taken almost two decades.

It is crucial that the most important phases of the advanced automation system continue and be supported by the industry and Congress. We cannot cancel the program and start all over.

We believe that the phases of the program which still can be implemented are the initial sector suit system and the terminal advanced automation system. These phases of the AAS are important to replacing old technology and providing the base system for future expansion.

The first meaningful productivity improvement to AAS—from the viewpoint of the airlines and other users—is the advanced en route automation phase known as AERA.

The software program known as "Initial AERA Services" should be pursued in parallel with the ISSS and TAAS phases to be ready for implementation as soon as possible after ISSS and TAAS are delivered.

The TAAS program is likely to change rather dramatically due to the FAA's recent unannounced change in plans to not consolidate all the terminal radar approach control facilities into 22 en route air traffic control centers and the New York TRACON.

For many reasons, both technical and political, this consolidation goal is apparently no longer realistic. We believe that FAA now plans to consolidate some of their TRACONS—about 38—into 10 locations. They no longer intend to combine en route and terminal air traffic control facilities. This will leave 170 small TRACON facilities that are not presently provided for in the TAAS plan.

This is a crucial decision because it now requires FAA to rethink the automation solution for small TRACONS. The answer is definitely not to begin a new acquisition process for these facilities because of the lengthy period of time required to complete a new acquisition.

Unfortunately, while the aviation user community is moving forward with technology advancements applicable to the future of air traffic control, the FAA continues to lag seriously in this area.

For example, the first Boeing 747–400 equipped with fully certified avionics capable of automatic dependent surveillance satellite data communication, SATCOM, was delivered in September 1990 to United Airlines.

ATA member airlines worked vigorously with the aerospace industry and the FAA for several years to achieve this objective. United States and international airlines, as well as international business aviation, are taking delivery of many more aircraft equipped with this capability.

The improvements to oceanic air traffic control are vital to achieving an acceptable return on investments made by the airlines and business aviation. We expect the delivery rate of new aircraft equipped with SATCOM to increase and some airlines will be retrofitting some of their aircraft with satellite communication and the Global Positioning System for navigation.

The airlines are relying heavily on the planned ATC system automation improvements for increased capacity in oceanic airspace.

We recently discovered that FAA has made no provisions to implement air ground data link communications in ISSS. The airlines have spent millions of dollars developing and pursuing certification of data link communications in anticipation that FAA will have the capability to accommodate data communications in the near future. Many of the airlines have recognized the value of data communications and have been using it in place of voice communications for many years.

Additionally, oceanic automation is impacted by the delay in AAS. The tools controllers are using to control aircraft over the ocean are the same as they used in the 1950 era. Oceanic controllers are still using maps, plexiglass, string and grease pencils to plan oceanic air traffic.

The Oceanic Display and Planning System contract was awarded in 1985 and still hasn't been completed. The latest estimates for full operational readiness of the ODAPS system in New York is 1995—ten years later at a cost of more than $50 million.

FAA intended to incorporate the ocean automation function in the AAS but now is considering another separate procurement due to the delay in AAS. Does this mean that the ocean air traffic controllers will wait another ten years before they have adequate tools to control aircraft over the ocean?

ATA had the opportunity to meet with FAA and IBM leadership a few days ago to help us to better understand the dilemma and to consider a constructive course of action.

FAA's Acting Administrator Del Balzo acknowledged that perhaps the most serious causes of the present situation were of FAA's own making. The most important, incredibly, has been the lack of active involvement of top management in the resolution of the growing difficulties. Perhaps most important, top management did not adequately monitor the process of laying out and then controlling the functional requirements the contractor was expected to meet.

We believe that the steps now taken and announced by FAA are prudent and we support them, subject to the recommendations below and assuming continuing vigilance and discipline by FAA and the contractor to assure that valid controller and user concerns are accommodated without generating additional delays. We believe the real challenge is to assure continuity of purpose and leadership to keep this program on the proper path.

As previously stated, we cannot allow the cancellation of AAS and start over. We agree that the proposed schedule of first operational commissioning of the initial sector suite system in October 1996 is probably the best that can be achieved, but we believe this schedule milestones must be strictly adhered to.

The first commissioning of real automation aids for comptrollers which will improve the system operation can't be allowed to be delayed until after the year 2000. Therefore, we recommend that FAA:

One, establish an internal advocate for the needs of the airspace users to balance these needs with the needs of the FAA organizations. We believe a new contract between FAA and the users is essential if user support for the program is to continue. We recommend that FAA, perhaps through this inside advocate, work with the user community on a reoccurring basis, possibly quarterly, to provide regular reviews of schedule and cost milestones as well as candid advice on obstacles that are impeding timely deployment in the field.

Two, proceed aggressively with the interim sector suite system as the foundation for what is to follow, freezing requirements soon, resolving remaining open issues and establishing a discipline for dealing with changes in requirements. Establish October 1996 first commissioning as a firm date for ISSS.

Three, decide soon on FAA facility consolidation. If the development and implementation of AAS is to proceed sensibly, it is essential that the long-delayed decision on FAA facility consolidation be made rapidly. Additional uncertainty, costs and delays must be expected if the consolidation decisions are further delayed.

Four, pursue aggressively the early implementation of the Automated En Route Air Traffic Control System functions and introduce the capability in Seattle immediately after commissioning of ISSS in order to provide valuable benefits to airspace users.

Mr. OBERSTAR. I am going to have to interrupt you at this point. I will have to recess the committee, vote and come back as soon as I can.

[Brief recess.]

Mr. OBERSTAR. The subcommittee will resume its sitting. Apologies from the Chair. There were two votes, not one.

Mr. Ryan, you were at the point of making point five.

Mr. RYAN. No. 5, proceed rapidly with the development of the terminal advanced automation system as the appropriate system evolution for major terminals and TRACONS.

Six, move rapidly to system decisions with respect to the right solution for smaller TRACONS, recognizing the benefits of using the already written TAAS software and AAS contractual arrangements for these systems.

Seven, pursue aggressively early implementation of the Terminal Area Traffic Control Systems, starting with the Center TRACON Automation System, initial CTAS applications should be on existing ARTS–III systems at facilities with digital displays and their en route facility counterparts. Plan on the earliest possible national implementation of TACTA capabilities, and related airport surface automation capabilities, on the TAAS.

Eight, review and reach decisions within twelve months as to whether the area control computer complex and the Tower Control Computer Complex are still the best solutions. As needed, modify the system architecture to encompass the new requirements.

In conclusion, we are reassured by the intervention of IBM's Federal System Corporation CEO Gerry Ebker in the management of AAS day-to-day activities. He brings a wealth of experience, tenacity and discipline to the process that is sorely needed.

However, I would feel more confident about FAA's management of AAS if Messrs. Hurley of Air Traffic and Kelly of Airways Facilities continued to play a permanent and more formal role in the AAS program management and reported directly to the FAA Administrator.

This concludes my statement, Mr. Chairman. I would be pleased to answer your questions at this time.

Mr. OBERSTAR. Thank you very much. Next is Mr. Olcott, listed next on our witness list.

Mr. OLCOTT. Thank you, Mr. Chairman. My name is John Olcott. I am the President of the National Business Aircraft Association. I am pleased to present the views of 14 major aviation associations identified in my prepared testimony. I ask that my full statement be made part of the official record.

Mr. OBERSTAR. You have already made that statement, sir.

Mr. OLCOTT. The FAA Advanced Automation System, like many of the projects, is four to five years late. Why did it happen? It was a combination of many problems that we have heard this morning. I will not reiterate them here. I think they have been well articulated this morning.

Because it had been agreed that all significant automation functions were to become part of the advanced automation system, a number of worthwhile automation R&D projects were put off. As the AAS delays began piling up, FAA found itself unable, because of the rigidities of the contracting process, and imposed upon itself to make, rapid structural adjustments.

What was done were frequent changes of specifications, compensated for by time extensions and reductions in delivery capabilities.

From the perspective of the customers for FAA services—the airlines, general aviation and the military—delays in AAS are serious. The FAA system plan initiated in the 1981–82 time frame featured the advanced automation system as its central element, the one part of the NAS Plan which promised major system improvements to the users.

The aviation community, in supporting the NAS Plan, realized that most of the projects were simply modernization and upgrading of FAA's aging facilities. Only when the terminal and en-route automation and datalink systems appeared would the users get real operational benefits.

What do we do now? There's a long litany of problems. It would be easy to find fault and lay blame but that is a fruitless pursuit and would just add to further delay and more costs.

It is far better to lay out the work needed to achieve early, tangible products and put those products in the field. We believe that the steps now taken and announced by the FAA are prudent, and we support them subject to the recommendations given later on in this testimony.

Yet we are also aware that FAA management has a history of changing very rapidly for many reasons and that the beneficial changes that we have heard about this morning can be erased by the stroke of a pen or by the turnover of leadership.

Our recommendations, sir:

There has been discussion of simply canceling the AAS contracts and starting over. Our organizations believe that this would be a great mistake and would simply create more delays. We believe the FAA must act, as it is doing so now, and establish a clear baseline for its efforts and make adherence to scheduling costs primary goals.

Commissioning real automation aids for controllers, aids that will improve the system's operation cannot be allowed to be delayed until after the year 2000. Therefore, our recommendations: We recommend that the FAA establish within the FAA's inner management circle an internal advocate for the needs of the customer for FAA services, to balance those needs with the needs and wishes of the FAA organizational elements. FAA, perhaps through this inside advocate, should work with the user community on a quarterly basis through the existing Advisory Committee system or through some other mechanism.

We recommend that the FAA proceed aggressively with the Interim Sector Suite System as the foundation of what follows, freeze requirements, and resolve remaining open issues rapidly.

We certainly agree that establishing October 1996 as a firm date for commissioning ISSS is appropriate and should be a firm goal.

If development and implementation of the Advanced Automation System is to proceed sensibly, it is essential that the long-delayed decision on FAA facility consolidation be made rapidly. Additional uncertainty, costs and delays must be expected if the consolidation decisions are further delayed.

We recommend pursuing aggressively the early implementation of the Automated En-Route Air traffic control system, AERA, and proceed rapidly with the development of the terminal advanced automation system, and move rapidly with respect to the right solutions for smaller TRACONs.

We recommend pursuing aggressively the implementation of the Terminal Area Automation System, TAAS starting with the Center TRACON Automation System, CTAS, and plan on earliest possible implementation of these capabilities nationally and related airport service automation capabilities within the Terminal Advanced Automation System.

We recommend reviewing and reaching a decision within 12 months as to whether the Area Control Computer Complex, ACCC, and the Tower Control Computer Complex, TCCC, are still the best solutions.

Mr. Chairman, there are other steps to be taken beyond the decision on facilities consolidation if FAA and users are to have a sound system, a sound planning basis for the future; and these are, in our opinion, decisions on the role of flow control and its relationship to ATC separation by AERA, and follow-on programs; decisions on the role of digital communications (data links) in the FAA automation system and development of appropriate standards; decisions on the manner and the time that airborne Flight Management Systems and area navigation capabilities will be accommodated within the FAA system; decisions on a flexible system architecture that can accommodate automatic dependent surveillance, en-route and terminal automation aids and runway incursion/airport surface automation; decisions on the way AAS will be designed to provide weather products and services to pilots and controllers.

We believe the FAA could be helped in other areas, internal structural issues that need to be addressed, and we have identified those in our prepared testimony.

In conclusion, the organizations for which I am speaking today support the dramatically refocused advanced automation system program for fiscal year 1994. But it must be said that our patience and our faith in FAA promises of program reform are limited. Good intentions are clearly evident in FAA's current senior management, but there has been a consistent pattern of failure and delay.

We believe the funding for the AAS program for future years should be carefully monitored from the top and tied to results from the credible refocusing of this program. At the same time, we believe it is extremely important that the FAA not be micromanaged. The FAA should be given the flexibility to achieve results on time and within cost. We also believe that they should be held accountable for getting the program solidly on track.

If they are unable to do so, the users will not be able to support the continuation of this very important and much needed program.

Mr. Chairman, my associates—Mr. Poritzky of Airports Council International, NA, and Mr. Brown of the Aircraft Owners and Pilots Association—as well as myself, would be glad to answer any questions you might have.

Mr. OBERSTAR. Thank you.

Mr. OBERSTAR. Mr. Poritzky and Mr. Brown, you don't have separate statements?

Mr. BROWN. No.

Mr. PORITZKY. No.

Mr. OBERSTAR. All right. We will proceed. The first thing I would like to get from the industry perspective is a response to a matter that the design of the system was intended to achieve some efficiencies for air traffic operating at high altitudes, and of course on the ground, and takeoff and approach procedures.

What is your understanding of the capability of AAS as designed to do those things, to select the most efficient air routes for safety and for fuel consumption and stick to them and give controllers the ability to manage traffic in the most effective, the most efficient manner while maintaining safety?

Mr. OLCOTT. We feel that there needs to be a parallel implementation of AERA as much as possible, so that we can appreciate and enjoy and use these advantages that you are talking about.

I would like to ask my associates on the table to elaborate on that.

Mr. PORITZKY. Mr. Oberstar, the National Air Space System Plan of 1982, early 1982, projected that the Advanced Automation System, with AERA included, with conflict-free routing would be first commissioned in 1993. It also had a number of other functions in it at that time.

As the witnesses this morning indicated clearly, as time went on, as the delays built, as the requirements changed continually, those future functions moved out in years in order to contain the costs. If you look at the most recent CIP, AERA would appear in the year 2002, 2003. As we said in our testimony that isn't acceptable.

The fact is that, what I want to call "the hooks and handles" for digital communications (datalink) to do some of the things that Jack Ryan was talking about, simply are not there in the current system. What we see is a very important but a much less capable system than we had hoped for. It is the foundation for what is to come, and we were heartened—certainly we were heartened that the new effort would try to implement some of the automation the AERA and CTAs functions—early on. We certainly hope, whether an oceanic operator or an airport operator that FAA will move rapidly on the accommodation of datalink communications. They await the implementation of ISSS.

Mr. OBERSTAR. What I have in mind among other things is the initial sector suite will have the capability for controllers to project where aircraft in their sector will be—will be from the point where they are now to where they might be one minute, two minutes, ten minutes from now. In order to maintain safety in the system, first of all, to avoid potential conflicts, but also to select the most efficient routes for best fuel consumption.

Now, have you looked at this aspect of the system and seen the technology and do you have confidence there will be that capability for controllers?

Mr. PORITZKY. Mr. Chairman, I need to turn this to Jack Ryan, but this basic capability of the system—providing alternatives for optimal routing—awaits the development of AERA. The system, as I understand it, as it will be delivered will be able to provide a projection but not a resolution.

The other thing that we have talked about at length in the discussions we have had with FAA is—and one of the system issues yet unresolved—is how the system will accommodate the ever more capable flight management systems, area navigation systems, that are in the airplanes. That accommodation requires the datalink I mentioned a moment ago.

FAA automation has a long way to go, but the foundation is coming. Without that foundation, the other things we need simply won't happen.

Jack, would you?

Mr. RYAN. Mr. Chairman, the efficiencies that the industry is looking for, for instance, user-preferred routes and on-time departures, user-preferred routes being the key, are not going to happen with the implementation of ISSS by itself in Seattle and throughout the rest of this system, beginning hopefully in October of 1996.

ISSS, when the ORD or operational readiness demonstration happens in Seattle, will come up with the current software that is operating on the Host system at the time of cutover; the controller will have a new 20-by–20-inch, high resolution, 2,000-line display with color, which will certainly be an improvement for him. It will also have the new flight data entry system, which by then IBM and FAA will have solved the problem of how to do that and hopefully will have solved it to the satisfaction of the controllers.

But the efficiencies that we are looking for will not happen until the introduction of initial AERA services. And they will do some of the things that you described. We are talking about conflict probe, future situation display, for example where the airplane is going to be 15 minutes, 20 minutes, a half-hour from now. The important one is conflict probe, so when you are sitting on the ground at Washington National and you are requesting clearance, you hope you will get a conflict-free route with no delay. You will get the route that you asked to fly, and if it is a transcontinental route—and I will have to use Dulles for the departure point in that instance—but if it is that kind of a route, it will be the one that best fits the profile for winds and fuel efficiency that day, and you will get the altitude that you want.

It will be a free-flowing system without the regimentation that we know today.

Now, all of the things we want are not going to happen in initial AERA services, but it will be quite a dramatic difference from what we have today. That is why both the Coalition—and ATA are recommending that AERA be worked on now and that those initial AERA services be brought on very shortly after initial commissioning in Seattle, possibly with the idea that was spoken of early today, which is with a separate processor on the local area network with the hundred or however many sector ISSS consoles, where it will do the AERA work. And it is my understanding that right now that concept is being studied at MITRE to see if it is feasible, and we would like to see that that work gets done quickly so we can move forward to getting AERA commissioned as soon as possible after ISSS.

The key here is that ISSS by itself does not provide the improvements. It is the software change, which now happens to be called initial AERA services, that provides it.

Mr. OBERSTAR. Is this a sequential thing that you are talking about, that ISSS is completed, installed, and that AERA functions; or should FAA be developing AERA in parallel?

Mr. RYAN. Indeed they should be developing this in parallel. It has been worked on for years.

Mr. OBERSTAR. That isn't going to distract the agency by putting more resources and more energy into AERA?

Mr. RYAN. I don't see that as a distraction, no.

Mr. BROWN. Mr. Chairman, I would like to add one bottom-line point; that is, that these software improvements for us as users are essential to get the investment out of the avionics in the aircraft we own and operate. Whether it is investment in satellite capability for the future or datalink capability, if we don't have these software improvements, we don't get the benefits out of our investment.

Mr. OBERSTAR. I will have further questions, but Mr. Horn is recognized at this time.

Mr. HORN. Thank you, Mr. Chairman.

Individuals on this committee and in this city that have a much longer institutional memory than I do would claim that FAA officials have come up over the years on other types of projects, and taken initiatives; and they have lagged, and they said, hey, we will get those programs back on the track.

Now, I think most of you were here during the testimony this morning. Most of us were very impressed that both parties took responsibility for what happened. And we received assurances that things would be back on the tracks with new management supervision, specific milestones being laid out.

I was wondering since you are all pros in this business, you have watched agency committee-agency vendor interaction in other areas. Do you think we should be assured by what we heard this morning, based on your experience and observation? Can FAA get this back on the track, or are we going to have billions more here of lag time, in your judgment?

Mr. OLCOTT. Mr. Horn, I believe we are all encouraged by what we heard this morning, and we are optimistic; but I believe it would be inappropriate to say that we are absolutely assured. We are going to observe the system, follow it very closely, and try to contribute wherever we can to bring about a successful program.

And this program is very important for the users. It is very important for the country. We want to see it work.

Mr. HORN. Do you all agree on that or are there differences and nuances among you?

Mr. BROWN. Mr. Horn, I would say some would call us professional cynics and maybe, in part, Congress sometimes shares some of that cynicism on the program. I think the fundamental reality is that we have seen over the last few weeks very much a novel, unique approach on the part of FAA and its contractors in recognizing us as customers, in addition to air traffic controllers, in coming clean on the past history of the program, and expressing really a very solid management plan and refocusing on their part. So that gives, obviously, the degree of optimism that we feel.

But as Jack correctly pointed out for all of us, our key area of continuing skepticism is when the new administrator is appointed and when DOT is populated, what will that mean for the commitments that we have heard? And I think it is obviously all of our roles to try to continue to press that point.

Mr. HORN. So you feel from your testimony and other things, that you have been consulted, you do have active involvement then? So you are happy with the degree of consultation at this point?

Mr. BROWN. Yes. I think it has to continue, especially as we come up to the April requirements freeze that was talked about so much today.

We have to continue to be involved in that process until the requirements are frozen, and then we have to stay in touch with them as the technology evolves. But once we are involved, as we are at this point, and there is that continuing involvement, I think we will help them through to the end.

Mr. RYAN. I think that an important point, Mr. Horn, is that we were asked about 10 days ago to meet at Gaithersburg with IBM and FAA leadership to gain our support of the present plan. And we made it clear to them, and also there is a recommendation in our testimony, that we don't want to be called upon only when the program is in trouble.

Because there was some discussion earlier this morning and some questions by you and the Chairman about who were the customers and the users in the system, I opened my statement by saying ATA, which represents the major airlines and a lot of the 400 million people who fly in those airlines every year, obviously are customers of the air traffic control system and its successor, the AAS.

So the recommendation that we want is to be in this loop much more often than we have been in the past, which is once in the last two weeks—we don't want to get just the bad news. We want to get the good news and we want to be able to track the system just as you do from your vantage point.

Mr. PORITZKY. I agree with everything that has been said. I have watched FAA for a long time from various vantage points, and I must say I have not seen before the kind of candor from the highest levels of FAA exhibited here today. That is most important.

I want to underline something Joe Del Balzo said this morning. Research and development is almost always a messy process. Those who would tell you otherwise, whether they come from GAO or OMB or wherever, are not telling it straight. Development in a time of technological revolution, such as we are in now, where we are now able to do things we wouldn't have dreamt of 10 years ago, makes the process even messier.

That is why, at the conclusion of our testimony, Jack Olcott said it is terribly important to give FAA leadership both the responsibility and the authority to use their own common sense and give them the flexibility to adapt to technological change. Yet is a messy process and undoubtedly will continue to be one.

Mr. HORN. I agree with that conclusion. I have been through these technological developments in the university, and things can slip through easily. You do suggest a dangerous alternative, which is the imposition of common sense as the standard, which might put us all out of business.

Mr. OBERSTAR. Mr. Coppersmith.

Mr. COPPERSMITH. Thank you, Mr. Chairman.

Mr. Olcott, in your testimony you talked about the use of OMB procurement procedures, and how they have slowed the process down. This may be the best-two-out-of-three falls, because we have had contradictory testimony from GAO and from FAA and the vendor going in.

I am looking for a little help in reconciling these different views, keeping in mind that some of the problems may have been caused by the administration at the FAA trying to use different ways of contracting, not by OMB regulations or by avoiding those regulations during the design competition.

I would like you to expound on that and see if we can understand exactly why the different perspectives are causing you and GAO to come to such different conclusions.

Mr. OLCOTT. In our briefing a week ago today, Mr. Del Balzo said categorically that he felt they had been able to better use the procurement process and that, institutionally, there were not restrictions.

We trust that is the case, but we remain a little skeptical, so we feel that procurement is extremely important in a program of this size; and everything should be done to make sure that the procurement process does not hamper the implementation of advanced technology.

Joe Del Balzo this morning indicated that FAA had been able to use the process of the design competition. He also said that it probably went on a little too long, because during that period FAA's experts were not able to talk to the two competitors in the design competition. That lack of communications, now with second sight, was probably a great handicap.

It is perhap not out of order for me to say that there was an FAA meeting in which Chris Kraft, who was mentioned this morning, was present. Chris Kraft met with the FAA Administrator Lynn Helms and others, and I was present. This issue was discussed, and Mr. Kraft made the point that he felt the idea of going with two design competitions was probably not fruitful, despite the OMB A109 directive, for two reasons: one, that it changed for the worse the relationship between the buyer and the seller; in other words, the essential interaction couldn't take place. Secondly, he felt that there was not, nor was there likely to be, enough talent in FAA to appropriately cope with two very large groups of designers. This morning Joe Del Balzo said he's going to live within the system, but he properly expressed some reservations about it.

Mr. OBERSTAR. The eight points, Mr. Ryan, that you raised in your testimony, I have asked the FAA to respond in writing; and I will share that information with you when we have it.

It does appear that the FAA is largely abandoning the consolidation proposal for major radar facilities. What is your view of that decision?

Mr. RYAN. Well, as you recall, the original ACF concept was to put 202 TRACONs in 23 ACFs and I think that was entirely too optimistic. And in fact, just a point on that, when the AAS contract was awarded, that 202 into 23 happened to be the thinking at the time which may not be the thinking now, which causes a different set of thought processes to go on, one.

And I hate to venture into why seven nines reliability is good or bad, but there was an awful lot of concern back there that if you put every TRACON in an ACF—23 centers and the New York TRACON—that if anything ever happened in one of these facilities, you would lose all of the center plus all of the facilities. So certainly wanting to reassure folks about reliability, you end up with an FAA requirement for, I think, what turned out to be seven nines which is 3.15 seconds a year max downtime; and I think that is a lot to ask for, even though Gerry Ebker said that he will get there. I think it was more important then, than it necessarily is now.

Mr. OBERSTAR. That raises the point, if we are not going to do all the consolidation, do we need to carry this system reliability to seven nines or nine nines?

Mr. RYAN. I think it is something the FAA should look at, and I am not necessarily looking for a payback from the question, from IBM, if you drop a nine, do you get money back; I don't think that is the important issue. I think the important issue is getting to Seattle in October of 1996.

The other issue—and there are more of them—and it came up briefly today was the fact that the original set of requirements called for 210 common consoles to play together.

Well, when you were going to put a number of TRACONs and the center operating together under one roof, you may have wanted—although it might be a slight stretch, but you may have wanted to have 210 operate together.

Well, should IBM be trying to achieve what may be un—I am not saying it is achievable, but should they be trying to achieve this and is there any cost in schedule time and money to getting to 210 when the current thinking in FAA is that no terminal facilities will be consolidated into the centers and that they will have 10 medium control facilities, 10 MCFs, that will consolidate 38; and we will have 170 TRACONs where they are now.

Do we need 210? I don't think so. Because even if you were to figure that you needed 2.5 consoles for each sector, you know—you have been to the DDF, common console is a Sony display and the data display on top of it. And the thinking is, in a lot of sectors you can use two of those consoles as a sector suite. Well, assuming some may be three, and you average it out to two and a half for the sake of the argument, if you ran 150 common consoles that would be 60 sectors in one center and I don't know of any that have more than 45 at the present time. And certainly the idea in managing air space is not to make it smaller and divide it up into more sectors.

I guess the question here is, I think FAA and IBM need to look at the 210 number and not be trying to achieve something that may be impossible and unnecessary.

And as a direct answer to your question about it, I think—the present unannounced plan, as I understand it, I think makes more sense from a management standpoint, trying to manage the air traffic control system, than trying to put 208 TRACONS into 23 ACFS.

Mr. OBERSTAR. Well, I had the same concern about, to put it in the vernacular, putting all the eggs in one basket or all the computer chips in one or very few baskets. At any rate, I just don't think that makes good sense, even from a security standpoint or from an operational standpoint. The likelihood of something happening where everything is concentrated is huge.

Mr. RYAN. I think what FAA did to get to 10 ACFs is do something sensible, which is if there is an operational advantage—as they found in New York TRACON years ago and they are doing in the Los Angeles Basin Project now—if there is an operational advantage, then do it. If not, don't do it.

Mr. OBERSTAR. You said New York and that brings to mind, though, when the wrong wire was pulled and the whole system went down, the East Coast was shut down. You sure don't want to have that happen.

Mr. Poritzky.

Mr. PORITZKY. Mr. Chairman, I want to comment on the "seven-nines" (99.99999 availability) question. As Jack just indicated, if you don't put all your eggs in one basket, the impact of a failure is lessened. I want to remind you that Mr. Ebker this morning said something I believe is true, that no system has ever been built by anybody for any purpose that meets the "seven nines". In fact we wouldn't know if a system did.

But know that the *attempt* to create a system which meets the "seven nines" costs a very, very great deal of money. The important point, I think, is that FAA's facilities—and I probably don't have the number right—current have an availability on the order of 98.8, 98.7 percent, which is a long way from "seven nines". But on the idea that you can achieve the "seven nines", as Mr. Ebker said this morning, it is a desirable goal. It says we don't want this system to fail. That is what we all want.

Mr. Del Balzo made an important point this morning that if there is a backup, an alternative—and he mentioned the broad carriage of collision avoidance systems as one backup—the requirement changes. Automatic Dependent Surveillance may play a role as well, and the Cleever design; but I think as a broad issue. It is a political statement to say we are going to insist on "seven nines," because it is wonderful and everybody loves it. It is appropriate to look at what that statement, naked, does to the actual development process and the costs.

Mr. OBERSTAR. If you are not going to have the degree of consolidation initially envisioned—and maybe the more distributed system and less consolidation allows you not to push the envelope quite so far. And whether that is good or not, I don't know. But those who are designing and working in these systems now need to look at that aspect.

Mr. BROWN. Mr. Chairman, I think your point on consolidation is critical. And from one other perspective, thankfully, in Washington people are thinking more and more about cost saving; and if consolidation is not pursued as aggressively as originally imagined, there could be significant cost savings. Those of us who are users, who pay into the trust fund, have that as a key point that we are concerned about.

Mr. OBERSTAR. Mr. Olcott, you said that the OMB procurement procedures slowed the procurement process down. GAO has said that the process has been slow because those procedures have not been followed.

I have been around this testimony, not by you, but these same polarized viewpoints before. What is the better procurement process to follow, the one that was done for AAS or some other process?

Mr. OLCOTT. The exact—the best procurement process for obtaining advanced technology products is perhaps far beyond my expertise, but I submit that it is extremely important, when we are moving into advanced technology, that we try to find a process that allows the government to acquire the best state of the art even though that state of the art changes very rapidly.

When you limit the amount of dialogue between the FAA and its contractors during the procurement process, you may be freezing the level of technology earlier than you wish to, and you may be actually slowing down the process, perhaps increasing some costs for the amount of equipment that you are buying.

But it is a very involved issue. I think it is an issue that has to be examined. Mr. Del Balzo insists that he is not constrained at the present time by those institutional boundary conditions, and we trust that he is right.

Mr. OBERSTAR. I think the problem really is more in the way the contract was managed than the way the procurement was initiated. I was also somewhat more reassured by some lessons learned by both parties in the initial procurement procedure as well. I thought it was very good that FAA is saying that they did not want to be so proscriptive as to eliminate the imagination of the contractor to come up with ideas that maybe they hadn't foreseen, or that the FAA couldn't foresee, and to allow that creativity; but then also to stay on top of this program, manage it more effectively, set deadlines, live by schedules and not be unrealistic about what technology can achieve.

You were suggesting that FAA should increase its own in-house expertise in management and not rely so heavily on outside contractors. I have always felt the agency ought to have that kind of expertise, because when you have it in house you can be more flexible. But how many people does it take to do that?

Mr. OLCOTT. I think it takes an institutional attitude on the part of the FAA to try to nurture, to try to bring in the best talent in this particular field and to nurture that talent, to provide them with an atmosphere where they want to stay with the FAA and develop their expertise.

That is an issue that addresses not only AAS but the whole research and development environment within the FAA: How do you create the attractiveness to bring in the best and the brightest and keep them involved with the FAA?

Mr. PORITZKY. Mr. Chairman, to add to that, all of us on this panel are privileged to be represented on FAA's Research and Development Advisory Committee, and several of us have participated, recently in the Augustine R&D Review panel. One of the critical recommendations was that FAA needs a larger number—not a large number—but a larger number of highly qualified, competent computer scientists and engineers.

With the introduction of the NAS Plan, but without increasing the size of FAA staff expertise at the time when its F&E programs were growing by 10 to 1, the R&D elements of FAA shrunk to almost nothing. You have heard in other testimony that FAA has tried hard, starting with Admiral Busey about two-and-a-half years ago to regrow its R&D capability. I believe, and the FAA R&D Advisory Committee has said so eloquently, that AAS must have a critical mass of people. Otherwise the contracts will not move.

Mr. OBERSTAR. That is a very important point, and we will pursue that matter, as well, through the subcommittee. I think it is extremely important for the procuring agency to have the talented personnel and informed, experienced personnel to know what it is they are taking delivery of and whether the contract meets expectations and whether it is going to deliver the product as intended and as needed in the system. So you have to have that high level of capability, keep up your good work. That is very important.

There are many other questions we could pursue. I think we have exhausted the important ones and the policy questions. Your contribution has been very important. I would just close with the observation that—about the question I asked earlier about reliability of system, and counsel passed me a note. Ninety-eight percent availability, the system would be down about 10 hours a year; at 99 and four nines or five nines, you are talking about three seconds—three seconds a year. So there is a difference in the reliability and ability of the system to perform.

Mr. Coppersmith, any additional questions?

Mr. COPPERSMITH. No, Mr. Chairman.

Mr. OBERSTAR. Thank you very much.

Mr. OBERSTAR. The next panel includes Mr. John Thornton, Director of Legislative Affairs for the National Air Traffic Controllers Association, and Mr. Howard Johannssen, president of Professional Airways System Specialists.

TESTIMONY OF JOHN F. THORNTON, DIRECTOR OF LEGISLATIVE AFFAIRS, NATIONAL AIR TRAFFIC CONTROLLERS ASSOCIATION; AND HOWARD E. JOHANNSSEN, PRESIDENT, PROFESSIONAL AIRWAYS SYSTEM SPECIALISTS

Mr. OBERSTAR. Mr. Thornton, we welcome your participation here and your presence throughout this very long day. Thank you for being here and we look forward to your testimony.

Mr. THORNTON. Thank you, Mr. Chairman. It has been my pleasure.

As you know, NATCA represents the 14,700 air traffic controllers employed by the Federal Aviation Administration. We are pleased to share our views and concerns with you today on the delays, technical problems, and cost escalation in the FAA's advanced automation system.

This is not only an air safety issue, but in these difficult times, it is a very important national economic issue. We applaud you and your subcommittee for the leadership role that has always been exhibited in the air safety arena.

The worst-kept secret in the aviation community is that NATCA and the FAA have had serious disagreements over the development and implementation of new technology, especially those technologies surrounding AAS. We felt that controller input was being ignored and the FAA was allowing the contractors to decide what would be best for the working ATC environment. The fact that we are having this hearing would suggest that our estimation has been correct.

We are here today, however, not to throw darts at the FAA or the contractor. Like you and your subcommittee, we want to see where we are, what can be salvaged, or for that matter, if anything should be salvaged.

In 1983 when the advanced automation system was being discussed conceptually, controllers looked at it with guarded optimism. It was hoped that the AAS concept would do everything that we were being told that it would do. Unfortunately, the AAS problems began early on in the design stage. The new ISSS sector suite looks great, but is it functional?

I visited the DDF earlier this week for briefing on AAS and ISSS, and was given the opportunity to play with the ISSS. I have to tell you, as an old controller, it was a lot of fun. My eyes were wide. I admit to a shortness of breath. Then, as I worked past that feeling of awe, I realized that the system that I was being shown was more labor intensive than the system in use today. It was also in use when I was a controller.

For example, a controller today only has to turn a knob to get that projected vector line that you spoke of. Now, the controller will have to make 16 key entries to do that.

We have been informed recently that it can be put into a soft function, but in that soft function, you would only get two settings. It is much less flexible. This is a concern we have made known at many hearings in many meetings with the FAA, and I was surprised to hear Acting Administrator Del Balzo is unaware of that concern. It is one of the most easy concerns to explain, and lay people can understand it. It is just a description of what is going on.

Also we are concerned about the new computer command functions. Today a controller can hit a switch or type in the letters FP with the aircraft's computer identification number to obtain a aircraft's route of flight. With ISSS, the switch is not available, but he or she will have to type in the letters RO. It may seem like a petty complaint, but those two changes, the change of letters for the command, doesn't make sense to a controller who works day in and day out. We would like the agency and IBM to make every effort possible to keep the commands that are in place today and only change the ones that need to be changed.

As it is, with ISSS a controller is going to have to learn over a hundred new commands, so if we could keep that at a minimum, we think we would be better off.

As you know, control positions are combined and decombined, often depending on time of day and traffic demand. Currently, this is a fairly common and easy process. Necessary condition and/or advisory information is passed between controllers on a sheet of paper or is written with grease pencil on a plexiglass board.

With ISSS, that necessary information will have to be retyped into the new position when combining or decombining. This could be a very time consuming process during a peak traffic period.

Most human factor experts say that you should fit the machine to the man or woman, not vice-versa. The FAA has a human factors team in place with respect to AAS. It is known as the computer-human interface team. Obviously, the FAA's emphasis is on the machine.

NATCA believes that the emphasis should be on the human, and the machine should be made to fit the human needs.

The problems encountered by the FAA on AAS further convince us that the agency is in dire need of restructuring. Not only does it need to streamline procurement processes; along with strong congressional oversight, there must be a way for the users of the system to have increased authority.

NATCA believes that the answer to many of the FAA's problems could be solved by restructuring the agency as a quasi-government corporation. Certainly, the handling of the AAS underscores this need. We submitted such a proposal to Candidate Clinton in September of 1992 and have provided you with that proposal also.

Mr. THORNTON. Earlier, in the previous panel, you talked about having that R&D expertise available and that computer expertise available in the FAA. Under today's rules for civil service, you won't be able to keep that, because once a person reaches a certain level of expertise, they are going to leave, because they can make more money on the outside. They don't have to worry about inflated health care costs. They don't have to worry about their retirement being cut. Nor do they have to worry about their salaries being frozen.

Where do we stand now and where should we go? Clearly, to date, the AAS has not been managed well, but we do not believe that it should be scrapped nor should we start over. Air traffic controllers are looking for better PVDs, more reliable equipment; and AAS, at least in part, shows the most promise of being able to deliver.

NATCA President Barry Krasner recently met with Acting Administrator Joe Del Balzo to discuss AAS and the challenges facing the air traffic control system in the near future. As a result of that very open and honest meeting, President Krasner is very optimistic and views Del Balzo's involvement in the project as pivotal.

During their exchange, NATCA has been promised increased and more direct involvement in the project. This does seem to be happening already. I spoke with a fellow that is working on AAS, who is the NATCA representative, last night, and he says almost overnight his access and ability to have input has multiplied.

With those assurances and with faith in Mr. Del Balzo's ability, we recommend that this subcommittee accept the FAA's proposal to continue with the delayed AAS project.

And that will be the end of my statement. I am available to answer any questions you may have.

Mr. OBERSTAR. Mr. Johannssen.

Mr. JOHANNSSEN. I will summarize. The day is getting late and I know that it will go into the record.

The Professional Airways System Specialists, which is a division of District Number 1, MEBA/NMU, is the exclusive representative of more than 10,000 safety-related employees of the Federal Aviation Administration. These aviation system specialists are those also very much affected by the advanced automation system project.

The advanced automation system includes interim enhancements and future replacements of existing equipment and structures. This transition involves thousands of major and minor changes in a live system environment. As the transition continues, our members must train for the new technology while maintaining the existing systems and equipments to an extremely high degree of reliability.

It is becoming close to impossible for the system specialist to sustain this reliability.

Maintaining the existing national air space system is becoming increasingly difficult. Over the last five years technical problems in automation systems in use at air route traffic control centers have increased dramatically. Replacement parts are hard to come by or are no longer available. Scheduled outages requiring corrective actions on these systems have increased, as have unscheduled outages. Simply said, we are being put in a position that will soon have us holding the system together with twine and baling wire.

Most of the existing computer equipment in use in the air route traffic control centers, ARTCC, was installed in the mid–1970s and is a product of 1960s technologies. The DCC is no longer supply supported. Spare parts must come from existing supplies at the facilities or must be specially ordered. Schedule outages requiring corrective maintenance have more than doubled, creating an increased work load on the already short-staffed system specialist's work load. The CDC-equipped air route traffic control centers at Miami, Atlanta, and Houston have no room for expansion.

There has been a 60 percent increase in maintenance actions overall for this equipment. Again, this aging equipment is causing an increased strain on an already overtaxed technical work force.

We feel that scrapping the entire plan for the advanced automation system and continuing with the present system is not a viable option. The technical work force is already taxed to its limit. Most of the remaining experienced system specialists to maintain the existing automation equipment within the NAS are near or past retirement age.

By the FAA's own projections, almost 60 percent of the automation technicians will retire before 1998. Even if the FAA were allowed to hire the necessary additional specialists and replace those retiring, it would require extensive training and experience to maintain these systems. Therefore, we must absolutely go ahead with the advanced automation system.

Despite the present problems with the delay in the AAS, the initial phase proceeded well ahead of schedule and the peripheral module replacement item, which replaced the radar data acquisition subsystems and the data receiver group and the radar multiplexer at the centers, has increased the input capability and speed of the automation systems.

We understand that this is only the first step in the planned transition to the advanced automation system. However, it is working well, and a complete start-over of the AAS project at this point would not be practical. That would leave the current problematic equipment in place longer while the design of new equipment and software is developed from ground zero. The FAA and our members would still be faced with holding an antiquated system together with too few people and inadequate resources.

As you are aware, we have testified over the last several years on the effect of that inadequate staffing in operations and facilities that the F&E would have on the NAS modernization. In part, the delays in the development and deployment of this and other systems are the result of the FAA's failure to address its technical staffing requirements.

However, the responsibility must also be shared with Congress and the previous administrations. The continued failure to hire the technical personnel, and delays in delivery AAS and other equipment are no secret. As President Clinton recently said, I quote, "We need a change in America." And he is absolutely correct.

This Congress also needs to change. This Congress must begin to act on what is urgently needed. Our Nation's economy, defense, and world competitiveness depend on a safe, reliable, and productive aviation system. If this Congress does not address the problems we speak of here today, then we will have lost an opportunity to achieve the goals laid out by the new administration.

We do know that the FAA and IBM cannot continue on the present course of the advanced automation program without change. PASS supports the projected delay in development and a redefinition and new direction of the project. Any new hardware and software systems introduced in the NAS must meet stringent requirements in order to ensure the safety of the system. These systems must be proved reliable before dismantling what is now in place. We provide the largest and safest air traffic control system in the world and new systems must meet or enhance that level of operation.

It is imperative to remember that FAA cannot continue to eliminate the technical positions I spoke of.

That will conclude my testimony. I would be happy to answer any questions you might have.

Mr. OBERSTAR. Thank you very much, both of you.

Operators are users of the system, and in a different way from ATA and the other witnesses on the previous panel. You folks on the firing line have to operate this technology.

It troubles me very greatly, Mr. Thornton, to hear you say that a controller has to learn a hundred new commands. Is this supposed to make things more efficient?

A question I asked earlier today of Mr. Del Balzo, is this system going to produce productivity improvements and efficiencies in operation, and how do you measure them? And he was not prepared to answer with any degree of specificity. But if one measure of productivity improvement is fewer steps, fewer strokes, fewer actions by a controller, then they are not achieving that goal, if what you say is correct.

Mr. THORNTON. That is correct. As you know, out there at the DDF, the equipment is beautiful, it is very flexible in many ways. You can move images around on your screen; you can bring several images to eye level. That is all very good and should increase the margin of safety. However, to do this, if you have to start learning these 100 commands and changes, and the commands you are using today are not carried over into the new system, it just doesn't make sense to us.

We understand we are away from the switches and rheostats and all, but the work load should be amenable to make the screen do what needs to be done.

Mr. OBERSTAR. This matter of key strokes of having to take your eye off the screen and type something into a keyboard in order to get responses could pose some operational or safety problems, couldn't it?

Mr. THORNTON. Absolutely. If you are not looking at your screen like you should be, any time you look away, there is an area of harm there.

Mr. OBERSTAR. What about the electronic strips issue? Tell me what your view is of the proposed electronic strips versus the current system.

Mr. THORNTON. Well, we have been assured by Acting Administrator Del Balzo that when we go to Seattle we will go there with only electronic strips. They will be doing everything that they are supposed to be doing.

Some of our people are concerned about the loss of information with electronic strips. I think that is just something we have to get over as controllers and have more faith in the system.

If the system is only going to go down three seconds a year, we should be all right. It is just something we have to come to grips with.

I believe our organization's position is that we are in favor of having the electronic strips available.

Mr. OBERSTAR. Can't that information be stored? I asked this question at the development center. Can't that information be stored some way to be retrieved later? Wouldn't that solve the problem?

Mr. THORNTON. What the Controller would be afraid of is counting on this electronic strip board and having that information dump out somehow and then he or she would be left with you know 10 or 15 airplanes on their frequency and no information on them without going back in to, I guess it is the RO key now and aircraft ID, but I think we just have to get used to it.

Apparently some of the earlier runs on the electronic strips weren't that well. It was somewhat awkward.

Mr. OBERSTAR. There were too many key strokes to get the results?

Mr. THORNTON. Yes. What I saw earlier in the week leads to a lot of promise. I think we would be foolish to implement the program with anything less than the electronic strips.

Mr. OBERSTAR. The FAA testified that 43 percent of the capital improvement projects are completed, which presumably enhances the reliability and sustainability of the aircraft control system, but your testimony says that the membership's work load continues to grow and even intensify.

Why is that? Is that because older equipment that requires ever more maintenance or the new equipment is not as maintenance free as advertised?

Mr. THORNTON. Well, there are several things that come into play. One, we have 1,700 fewer controllers than we had in 1981 and there has been at least a 28 percent increase in traffic since 1981.

When the equipment goes down we don't get it fixed as quickly as we used to a generation ago. There aren't enough technicians in the facilities to assist and bring the equipment back up fast enough.

Mr. OBERSTAR. Will this modular system be easier to maintain? Have you seen that?

Mr. THORNTON. Yes. It seems like it should be easier to maintain and it seems like it has flexibility for the controller and/or the assistants if one is available.

The concern we would have is the increased key strokes that are necessary to do everything and combining and decombining positions is a major concern because that could happen very quickly, depending on what traffic comes into the system or as traffic dies down. So that happens quite often in the control environment where you have to open up another sector because of traffic.

Mr. JOHANNSSEN. I think as far as maintainability, no question that the new system will be easier to maintain from the standpoint of the state-of-the-art technology.

I think that FAA and IBM have done a good job in coming up with the present approach to the sector suite. I think the layout is appropriate. They have thought of, given a lot of consideration to allowing the controller to do his or her work while we change out a unit or do maintenance or make checks or whatever else.

I think they have done a very good job at that. However, in going through the facility and seeing the equipment, there are those things that are common to the new system that are common to the very oldest system I have ever worked on, and I have been a certified systems specialist within FAA since I started at Kennedy in 1968 and there are such common things as cables that bring signals, signal carrying cables and power.

At the facility, I guess I did the systems specialist things. I asked them to pick up the floor so I could see what is underneath.

As far as reliability and seven nines and nine nine's, I agree with FAA and folks who say we need the highest reliability, but being a practical person and having been responsible for a lot of equipment, I also know that those things that you plan most for, often the plan doesn't work and something goes awry.

So I think that we don't want to mislead anyone or I don't want to mislead anyone. When we work for reliability, that is the understanding of the equipment as spoken of not taking into consideration interactive cables and systems that feed the system.

There are a number of things that could go wrong that bring that reliability number back down. If that sector suite never failed in the next 100 years and you looked at a reliability number it couldn't be 100 percent because something else is going to fail to affect that.

It is important to remember high reliability, but those numbers mean nothing to the person having to maintain and care for it every day.

Mr. OBERSTAR. To what extent are maintenance technicians being brought into designing and configuring this system?

Mr. JOHANNSSEN. Unfortunately, a week ago we were asked to take a look.

Let me back up because I don't want to sound unfair. FAA is going through a cultural change in their management that we participated in. I guess the change started when Admiral Busey came to FAA and recognized that the greatest resource was FAA's people.

We have been becoming more involved in every facet of FAA involved with what we do. This project has been kind of a mantelpiece project where we haven't really been invited in until recently to participate.

Yesterday when I was at the facility I suggested, like everyone does that I have eight or ten critical constituents who work for me and I would like to bring those critical people in and let them take a look for about a week and report back findings and some things that they may find that were not considered just as a practical matter.

Mr. OBERSTAR. I am sure if you made that proposal to Mr. Del Balzo that it would be well received.

Mr. JOHANNSSEN. I have no doubt that Joe Del Balzo and the folks I have met from IBM and other contractors are going to do everything they can to get the show on the road and have it in Seattle in 1996.

Mr. OBERSTAR. Systems are in place now and means of communication established with direct lines from people responsible for the system who can get directly to the administrator. Mr. Thornton, FAA has told us that they have brought something in the range of 1,700 controllers into the process to be consulted on how the system should work from the standpoint of a working controller.

Have you talked with controllers who have been brought in and what are their reactions?

Mr. THORNTON. I don't know about the number 1,700.

Mr. OBERSTAR. That is not important. That is a large number.

Mr. THORNTON. 2152's who were at one time air traffic controllers. It is like me saying we can go to electronic strips because I don't have to deal with it.

I work behind a desk. So do they. We have had a lot of trouble over the years getting union participation on these different work groups that the FAA has. It was very recently that we got a controller on the OSAT team, which is the top team that oversees the whole project.

When he was put on that, they broke that team down into two or three different segments then, even further diluting what our representative could be privy to, but we have assurances now that we will have increased ability to be aware of what is going on and have input into the process, and we are very satisfied with that.

I think the test—I think we all agree that AAS will happen and it will happen probably on time in Seattle, but the real test is going to be the other projects and then what happens if Mr. Del Balzo retires in a year? Will that carry over? That is my fear. I think it is more of a structure concern than this is a personality thing where Del Balzo has taken it under his wing.

Mr. JOHANNSSEN. We happen to have a very dedicated gentleman in the right place at the right time. I share John's fears that depending on who might be the new administrator could change what I am telling you here by our ability to participate and be a resource for the agency in getting there.

Mr. OBERSTAR. Well, I have that very same concern, almost a fear; they bring somebody new in as Administrator of FAA who doesn't know all this background, and doesn't have understanding of all these systems. It is going to take a long time to get that person up to speed to understand the complexities, the nuances, the personalities, discussions that have taken place, agreements that have been entered into, and by the time that person becomes productive, he or she is ready to move on to something else.

Mr. JOHANNSSEN. Fifteen years ago, I sat here and talked about the brown book and a $7 billion investment into redoing the National Aerospace System. We are up to $33 billion and there were some folks who participated all along in those years, I think, with some good ideas.

As we talked about ideas today, particularly learning from those things, there may be some wonderful learnings in some of the testimony presented over the years as far as both cautionary as well as instructional and some things we might want to do or take a look at.

So I think there is another area of learnings that we would hate to overlook. We have a history of that before this committee.

Mr. OBERSTAR. Well, let's hope that we are through the learning curve and that the lessons have been learned, the application is being made, and that we can have a high degree of confidence that the right people are in the right places, that they are following a system that has been established to keep the program on track, and that we will see the delivery in 1995 and the operation of that initial sector suite in 1996.

I think with the spotlight on all the participants right now, I think there is a good chance that we will reach that goal. It is going to take everybody's effort between now and then to get there.

Do you think this consolidation idea is good or do you think that FAA ought not to proceed with consolidation to the extent of at least one of the plans circulating within the FAA?

Mr. THORNTON. I think some consolidation is in order, as long as it is well planned out and we are sure that it will benefit the users of the system, and take into account the impact it will have on the employees of the system.

Mr. OBERSTAR. You say some consolidation. What do you mean by that?

Mr. THORNTON. First of all, there are no consolidation plans as far as we know. The FAA is supposed to report on that at some time and never has, but I think everybody is looking towards the MCF's. That may be even a little too much depending where these TRACONs go, and it is just hard to say without having a plan to comment on.

We are concerned about consolidation because it affects the lives of our members. We are going to watch that very closely, but I think if the point can be made that there is a benefit to the system, then that is a different issue. We are not certain that is.

For example, some consolidation, if you took a consolidation of the Washington area, a lot of people talk about that because it lends itself to it. I don't think the air traffic services at Dulles, at Baltimore and at Washington National would improve. Probably the efficiency of those systems would deteriorate a bit because the ability of the controller at Washington National to work up and down really makes that system work over there.

Now, of course at Baltimore they have already split the facilities and they are talking about putting it back together now I think. At Dulles they looked at splitting it and have put that off; right at the spot of service deteriorating when you are only providing tower service, for instance, rather than tower and radar service.

Mr. JOHANNSSEN. I think it is silly because we are on the verge of GPS, but we don't know what the new satellite can bring to us.

I am on my way to Geneva next week to talk to several other nations about what they think it is. I think that some consolidation is appropriate, but I don't know how much. I don't think anybody does. I think once again FAA gets themselves in trouble in being just a little bit too aggressive. They have a lot to handle now and consolidation is something we need to take a close look at.

As Joe Del Balzo said, I think we need to talk to the customers of the system and see what their needs are. The consolidation position that we have today I think is based on lack of input from the customers, and I think we need to go back to the customers and see what they need from us before we start on decision-making on consolidation.

With GPS down the pike, consolidation may get us down to three facilities worldwide. It is too quick to jump at it. We need to study it.

Mr. OBERSTAR. If I understood Mr. Del Balzo's testimony this morning, he indicated there was a study under way in FAA to evaluate the various proposals. When that study is completed and they have had an opportunity to review it at the administrator level, they will share that information with the Secretary, this committee and they ought to call in controllers and specialists and get your views as well.

Thank you very much for your participation here today. It has been most helpful. You are at the heart of the system. You are the ones that have to operate and make these complex technologies work and function efficiently and serve the purpose and goal of safety and efficiency in operation of our air traffic control system. If the system is too complex, too burdensome, requires too much involvement on the part of controllers, it will not have achieved its objective.

We expect you to keep a close eye on all the further developments and stay in touch with us as you do with your own management within FAA.

Mr. THORNTON. Thank you, Mr. Chairman. Thank you for your leadership.

Mr. OBERSTAR. Thank you.

The committee will, as I have said earlier in the day, continue to monitor the progress of AAS very closely taking into account all of the testimony delivered today, the very helpful and thoughtful suggestions and the new attitude that has emerged between FAA and IBM and within those two organizations the new awareness and understanding at the level of Secretary within the Department of Transportation.

There certainly are going to be brought to bear a great deal of human resources, talent to monitor the system, and we will be following it very, very closely from here on out.

The subcommittee stands adjourned.

[Whereupon, at 5:05 p.m., the subcommittee was adjourned.]

PREPARED STATEMENTS SUBMITTED BY WITNESSES

STATEMENT OF JOSEPH M. DEL BALZO, ACTING ADMINISTRATOR OF THE FEDERAL AVIATION ADMINISTRATION, BEFORE THE HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION, SUBCOMMITTEE ON AVIATION, CONCERNING THE ADVANCED AUTOMATION SYSTEM. MARCH 10, 1993.

Mr. Chairman and Members of the Subcommittee:

I am pleased to appear before you today to discuss the status of the FAA's Advanced Automation System program, which we refer to as the "AAS" program.

The AAS program is a key element of the FAA's Capital Investment Plan (CIP), which represents a variety of technological efforts to modernize our air traffic control system. The CIP is an outgrowth of our earlier National Airspace System (NAS) Plan, commenced in the early-1980's as the largest and most complex Federal technology-modernization effort ever in the Federal civil sector. This effort was begun to replace the tube type technology--which was the norm in our aging air traffic control system--with modern technology capable of providing the improved productivity and safety benefits needed to meet growing air traffic demands. Several years ago, over 90 projects were transitioned from the NAS Plan to the CIP, which is a continually-revised 10 year plan for capital improvements determined necessary to meet changing and projected demands on our air traffic control system.

Much has been accomplished to date under the NAS Plan and the CIP. Over 96% of the projects are under contract, and 43% of the projects are completed. These plans have brought us improvements like the ASR-9 radar, operational at 47 airports, which provides better radar targets and improved weather detection; and the Low-Level Windshear Alert Systems that have been installed at 110 sites to provide hazardous weather alerts to controller personnel. Today's system offers a reliability and productivity unavailable a decade ago, when our planning efforts began in earnest. But much remains to be accomplished not only for the short-term, but in terms of additional planning for future improvements to the system.

One important lesson we learned along the way was the need to improve our acquisition processes, and several years ago we took strong action to do that. We have introduced greater discipline and structure into our procurement activities. I believe we have made important advances in this vital area, but I also recognize that continued focus and vigil are needed to see that we continue that progress. Our goal in each case, of course, is to develop, buy, and install the right equipment on time and on budget.

One thing that separates much of our work from other agencies is that the safety of our Nation's air transportation system must be foremost in our mind from conception of a project through installation and use by our controllers and technicians or by pilots. Every major technological conversion we make to our air traffic control system must work perfectly from a safety standpoint from the first moment; further, those changes must be essentially "invisible" to the system users. The painstaking process of initial and operational testing of new equipment sometimes, despite our wish for earlier payoffs, may account for added--but necessary--delay. There are also times that new technological breakthroughs provide real opportunities for improvements to what we earlier conceived, and we must alter course to take advantage of those chances. And, as we sometimes find, some of the projects we have undertaken prove considerably more complicated and difficult than either our experts or private sector experts believed to be the case; this is particularly true in the computer software area, where virtually every major procurer of technology reliant on extensive software development experiences unanticipated problems.

These factors mean that our acquisitions success in terms of time and cost has been somewhat of a mixed bag throughout the extraordinarily demanding task of revamping our entire air traffic control system. And this has proved to be the case as well in the AAS program, as I will describe in a moment. First, though, I would like to briefly highlight what the AAS program is.

The AAS program is the cornerstone of our current modernization efforts. The AAS contract was awarded in 1988, and was at that time the largest automation contract ever awarded in the civil sector. AAS will provide the capacity to handle projected air traffic load well into the 21st century. It offers increased productivity and safety benefits, increased reliability, and the adaptability to take advantage of new capabilities offered by satellite technology.

In developing the AAS program, we have worked with the aviation user community, and have actively involved working FAA controllers and technicians. The involvement of the aviation community and our air traffic controllers is critical to producing the right products. Early controller involvement has resulted in many changes that will improve our final product. Although user involvement in these early stages has resulted in requirements changes to the program, we believe it has been best to introduce needed changes early on rather than fielding a system that is not acceptable to our workforce or that must be changed later on.

There are five components to the AAS program. The first element is the Peripheral Adapter Module Replace Item (PAMRI), which substitutes for several pieces of existing equipment at our air traffic centers. PAMRI provides higher data transmission rates for radar site interfaces, and will permit the later introduction of data from additional radar sites to a particular facility. It will support full air traffic control operations under the present system, while providing the needed redundancy to support transition to the second phase of the AAS program--the Initial Sector Suite System (ISSS).

The ISSS component will introduce new air traffic control work stations into our air traffic facilities that control en route flight. It will rely principally on the automation capacity afforded by our earlier acquisition and installation of improved main frame computers in all of our air traffic centers. These "Host" computers have performed extremely well since their completion in 1988.

Each work station or "sector suite" will consolidate controller functions now performed at several scopes or workplaces into one suite. Improved data portrayal will be available to our controllers through much enhanced displays that offer higher resolution, color, and better depicted weather information. Electronic flight data, in lieu of handwritten paper strips, will also be available. The sector suite configuration, along with communications improvements, will enable us to simply and speedily reconfigure airspace within an air traffic center to respond to staffing or workload requirements. It also enables a supervisor to monitor on one screen air traffic activity at any control station under that supervisor's authority. Today, a supervisor must walk around the control room in order to observe air traffic activity.

The ISSS portion of the AAS program provides the needed platform for the subsequent achievement of a variety of user benefits that are offered by other elements of the AAS program. Remaining elements of the overall AAS program include: TAAS--Terminal Advanced Automation System--new equipment and software for the terminal operational environment; TCCC--Tower Control Computer

Complex--new software and selected hardware upgrade for airport control tower operations; ACCC--Advanced Computer Complex--new software and selected hardware upgrade for consolidated air traffic operations; and AERA--Automated En-Route Air Traffic Control to facilitate fuel savings and other efficiencies in the en route air traffic environment.

When AAS is completed, computers will perform many existing controller functions that can be done more efficiently and precisely by automation, freeing controllers to perform functions that humans can do better. For example, the AERA portion of the AAS will evaluate radar data to combine aircraft locations, altitudes, and velocities along with wind speed predictions. Looking ahead as much as 20 minutes into the future, it will scan for potential conflicts with other aircraft, highlighting in bright red the potential collision course on the controller's display. AERA will then rank potential course corrections for the controller who will decide what action to take. This will help tremendously in assigning aircraft more direct and fuel efficient routes, saving time and money.

As I mentioned earlier, our success in the overall AAS program to date has been mixed. PAMRI is a real success story, with the last system to be implemented this April, ahead of schedule. And our user teams and the creation of the Development Demonstration Facility have been invaluable in helping to assure that fielded products will be useable, acceptable, and appropriate to the task. But we have experienced problems with ISSS, as I will describe.

About 2 years ago, FAA and IBM modified the AAS contract, which resulted in a 19-month delay for ISSS. Five months of the delay were due to FAA changes in requirements and the remaining 14 months resulted from software development difficulties encountered by IBM. This past November, IBM advised us that it would experience an additional 14 month slippage in the program due to significant software development problems.

Following that notice, we acted promptly to insist upon a proposed plan from IBM to cure this problem, to set course corrections, and firm up a schedule. IBM responded with an initial proposed cure plan. A senior-level FAA team was appointed to work directly with IBM officials to see that this plan was strengthened to meet our requirements. IBM has recently provided us with its "cure" plan, which is under technical review within the FAA. On a separate track, IBM has already taken a number of positive actions, which they will describe today, to respond to the problems encountered with the ISSS program. They now have a much-strengthened management focus on this program along with a greater resource commitment. IBM has also strengthened its internal audit of ISSS as well as its testing procedures.

FAA has taken several major steps to change the way we have done business with the AAS program. Our review of the problems encountered with the program indicates to us that we previously did not exercise sufficient, continuing top-management focus on the program; that we have generally taken far too long to respond to technical issues or problems raised by IBM; and that we were not providing adequate top-level attention to requirements changes in the program. The recent changes we have instituted address all these issues.

We have restructured our management of the AAS program to provide program support and oversight at the top. A program director for the overall AAS program now reports directly to the Administrator. The program director is empowered to make decisions on issues affecting requirements, except where schedule or cost of the program will be affected by a requirements change. That authority is reserved to the Administrator. The program director will be accountable for cost containment and keeping the program on schedule. The FAA's Acquisition Review Council, chaired by the Administrator, will review the status of the AAS program at least every two weeks, and more often if necessary.

We are also establishing separate program managers for the different segments of the AAS program. We have already selected the program manager for the ISSS segment. The segment program managers will report directly to the AAS program director, who will have responsibility for overall direction and program coordination.

The FAA has now established a dedicated ISSS team on site at IBM. The team includes representatives from our air traffic and airways facilities organizations, as well as a contracting officer. This team is fully empowered to resolve issues as they arise, eliminating the decision-making delays of the past where it simply took too long for us to come to grips with technical problems. We have worked our way through nearly 100 open items in the last several weeks, leaving two major technical issues on the table.

Another key step we have taken is to fix the requirements for ISSS. We need to assure that we have everything our controllers need under this program, but we also need to provide a steadier target for IBM to work toward. We need to separate the "nice to haves" from the "need to haves," and we are doing that. Toward this end, we have established an operational suitability action team.

We plan to freeze requirements for the ISSS by April 1. I want to stress that this freezing of requirements does not mean that there will be no additional changes to the system. Based on prior experience, I am sure that operational testing of ISSS will highlight some aspects of the system that need tweaking or changing before full-scale deployment can begin. We are, however, committed to maintaining much closer control over any requirements changes than was the case before. I would also add that there may be requirements, which we believe are needed, but which can be deferred until after an operational system is fielded. In those cases, sticking to the schedule will take top priority. Schedule and cost considerations will be much greater drivers of this program than before. I can assure you that we are committed to fielding an operational system in Seattle in October 1996, and that we will do all we can to make that goal a reality.

So far, I have discussed what we have done to address problems with the ISSS segment of AAS. I would like to briefly touch on the status of the rest of the AAS program. As I mentioned earlier, the terminal AAS or TAAS will introduce new equipment and software into the terminal operational environment. The lastest TAAS milestone demonstration was successfully concluded this February. However, delivery of TAAS will be delayed by 7 months due to the ISSS delay.

The tower control computer complex--TCCC--and the area control computer complex--ACCC--are unaffected by the ISSS slippage. Funding restrictions, however, have decreased activity in these segments, and we are reviewing the impact of these restrictions on program schedules.

With respect to AERA, we are currently reviewing what actions we need to take to make AERA available as soon as possible after completion of ISSS. AERA, as I mentioned earlier, offers significant benefits to the user community. Therefore, we plan to bring it on line at an earlier phase of the program than was first conceived. This is a high priority with us.

In closing, Mr. Chairman, I would like to emphasize the importance we place on the AAS program, and the need for its timely completion. AAS is an investment in our air transportation infrastructure that is needed to take the aviation industry into the 21st century. We deeply regret the recent slippage we have encountered in the program. The steps we have taken reflect our commitment at the top to provide a much improved foundation for managing the program in a way that will keep it on budget and on schedule. I assure you that we will not relent in these efforts.

That completes my prepared statement. I would be pleased to respond to questions you may have at this time.

STATEMENT
OF
GERALD W. EBKER
IBM VICE PRESIDENT
CHAIRMAN AND CHIEF EXECUTIVE OFFICER
OF IBM's FEDERAL SYSTEMS COMPANY

BEFORE THE SUBCOMMITTEE ON AVIATION
HOUSE PUBLIC WORKS AND TRANSPORTATION
COMMITTEE

MARCH 10, 1993

INTRODUCTION

THANK YOU, MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE.

MY NAME IS GERALD W. EBKER. I APPEAR BEFORE YOU TODAY IN SEVERAL CAPACITIES. AS A VICE PRESIDENT OF IBM, I SERVE AS CHAIRMAN AND CHIEF EXECUTIVE OFFICER OF THE FEDERAL SYSTEMS COMPANY, A SEPARATE ENTITY DEDICATED TO SERVING THE UNIQUE NEEDS OF GOVERNMENT CUSTOMERS. I AM ALSO PROJECT MANAGER OF THE FAA'S ADVANCED AUTOMATION SYSTEM (AAS). THE LAST TITLE IS UNUSUAL TO BE HELD IN CONJUNCTION WITH THE OTHER POSITIONS, BUT IT REFLECTS MY PERSONAL AS WELL AS IBM'S CORPORATE COMMITMENT TO THE SUCCESS OF THIS IMPORTANT PROGRAM. I ASSUMED THE ROLE LAST DECEMBER WHEN I DECIDED THAT I NEEDED TO BECOME PERSONALLY INVOLVED IN ASSURING THAT AAS MEETS ITS TECHNICAL, SCHEDULE AND COST MILESTONES. BASED ON THOSE RESPONSIBILITIES, I AM HERE TODAY TO TALK TO YOU ABOUT AAS'S RECENT PAST, ITS PRESENT PROGRESS AND THE OUTLOOK FOR A SUCCESSFUL COMPLETION.

FIRST LET ME RECOGNIZE THIS COMMITTEE'S LEADERSHIP IN AUTHORIZING THE ADVANCED AUTOMATION SYSTEM AND OTHER PROJECTS WHICH HAVE SUCCESSFULLY MADE USE OF EMERGING TECHNOLOGIES IN SUPPORT OF AVIATION. THE RESULT IS UNITED STATES WORLD LEADERSHIP IN AIR TRAFFIC CONTROL SAFETY AND AUTOMATION.

As you know, IBM's Federal Systems Company (FSC) is the prime contractor for the development of the FAA's Advanced Automation System. Including our major team members, Computer Sciences Corporation (CSC), Raytheon and Sony of America (SONAM), the IBM team consists of forty companies representing a workforce of almost 2,500 people in 11 states. Most of those employees work at IBM's facilities in Rockville, Maryland, and English Creek, New Jersey.

IBM commitment to Air Traffic Control and AAS

IBM's Federal Systems Company has a history of commitment to air traffic control automation in this country. FSC was involved in the development of the NAS Enroute Stage A program in the late '60s and early '70s. Parts of that system are still in use today.

In the late '80s IBM completed the re-hosting of the software in that system to more modern computers as a major step in the FAA's overall Capital Investment Plan (CIP). The reliability of that system - known as the Host Computer System - has far exceeded what the FAA requested.

ADVANCED AUTOMATION SYSTEM (AAS)

TODAY'S AIR TRAFFIC CONTROL SYSTEM CONSISTS LARGELY OF THREE SEPARATE SYSTEMS OR TYPES OF FACILITIES. THE TOWER FACILITIES HANDLE TAKE-OFFS, LANDINGS AND GROUND SUPPORT AT AIRPORTS. THE TERMINAL RADAR APPROACH CONTROL FACILITIES, OR TRACONS, CONTROL APPROACHES AND DEPARTURES WITHIN A 30-MILE RADIUS AROUND THE AIRPORTS. FINALLY, THE AIR ROUTE TRAFFIC CONTROL CENTERS (ARTCCS) DIVIDE THE AIRSPACE ACROSS THE COUNTRY FOR ENROUTE CONTROL OF FLIGHTS. (EXHIBIT A)

THE ADVANCED AUTOMATION SYSTEM WAS DESIGNED AS THE REPLACEMENT SYSTEM THAT WOULD INTEGRATE AND SUPPORT ALL OF THESE FUNCTIONS IN ONE COMPREHENSIVE SYSTEM OF THE FUTURE. THIS IS AN IMPORTANT POINT, BECAUSE AS WE TALK ABOUT VARIOUS SEGMENTS THAT MAKE UP AAS, IT SHOULD BE REALIZED THAT THOSE SEGMENTS WERE CONCEIVED AS AN IMPLEMENTATION APPROACH OR A MEANS OF TRANSITIONING TO THE FULL SYSTEM. (EXHIBIT B)

THE ARCHITECTURE OF AAS WAS SPECIFIED BY THE FAA. IT IS A HIGHLY EXTENSIBLE ARCHITECTURE THAT WILL SUPPORT GROWTH WELL INTO THE 21ST CENTURY. BY ADDING OR REMOVING PROCESSORS, THE SYSTEM IS SCALABLE FROM THE LARGEST CONTROL FACILITY DOWN TO THE SMALLEST APPROACH CONTROL FACILITY. THIS DISTRIBUTED ARCHITECTURE IS BEING RECOGNIZED AROUND THE WORLD AS THE STANDARD OF AIR TRAFFIC CONTROL SYSTEMS OF THE FUTURE.

AAS HAS BEEN DESIGNED TO MEET STRINGENT PERFORMANCE AND AVAILABILITY REQUIREMENTS. FOR CERTAIN CRITICAL FUNCTIONS, THE SYSTEM CAN BE DOWN FOR NO MORE THAN THREE SECONDS PER YEAR. SOLVING THIS CHALLENGE ALREADY HAS LED TO THE SUBMISSION OF TWO PATENTS. THE FIRST INVOLVES AN APPROACH FOR MINIMIZING THE SCOPE OF FAILURES AND REDUCING THE TIME REQUIRED TO RE-START THE SOFTWARE. THE SECOND PATENT INVOLVES A DYNAMIC STORAGE MANAGER THAT CONTINUOUSLY SELF-TUNES THE MEMORY USAGE OF EACH PROCESSOR IN THE OPERATIONAL CONFIGURATION. AAS CLEARLY BREAKS NEW GROUND IN MOVING TOWARD HIGH-AVAILABILITY SYSTEMS THAT MUST RUN CONTINUOUSLY.

AND SINCE THE AAS ARCHITECTURE IS BASED ON COMMERCIAL PRODUCTS AND INDUSTRY STANDARDS (LIKE OPEN SYSTEMS INTERCONNECTION PROTOCOLS), IT WILL SUPPORT TECHNOLOGY UPGRADE WELL INTO THE FUTURE.

THE ADVANCED AUTOMATION SYSTEM HAS FIVE INTERRELATED COMPONENTS OR SEGMENTS: THE PERIPHERAL ADAPTER MODULE REPLACEMENT ITEM (PAMRI), THE INITIAL SECTOR SUITE SYSTEM (ISSS), THE TERMINAL ADVANCED AUTOMATION SYSTEM (TAAS), THE TOWER CONTROL COMPUTER COMPLEX (TCCC) AND THE AREA CONTROL COMPUTER COMPLEX (ACCC).

PERIPHERAL ADAPTER MODULE REPLACEMENT ITEM (PAMRI)

THE PAMRI SEGMENT DOUBLES THE NUMBER OF INTERFACILITY COMMUNICATION CHANNELS TO 50 IN AIR ROUTE TRAFFIC CONTROL

Centers (ARTCCs) and also increases the number of radars that can be accommodated by the Host system to 25. All 20 PAMRI systems were delivered and accepted on or ahead of the schedule established in 1988. To date, 18 centers are operational, and the system is exceeding both availability and reliability requirements. There have been no major problems with PAMRI requirements or implementation.

Initial Sector Suite System (ISSS)

The Initial Sector Suite System (ISSS) is the next major step in the FAA Capital Investment Plan transition. ISSS continues to use the Host system for the fundamental air traffic control functions, but introduces a totally new work environment for the controller. (Exhibit C) The new workstation includes ergonomically designed equipment, state-of-the-art raster display technology, and a digitized auxiliary display for controller charts, maps and other key information. Combined with the Voice Switching and Control System (VSCS), ISSS will provide the flexibility to reconfigure facilities to more readily meet the airspace user requirements for air traffic services.

Equally important, but not visible to the controllers or the users, ISSS provides the commercial hardware and operating system, real-time system services, networking capabilities and an advanced availability management structure that will

BE THE PLATFORM FOR FUTURE SEGMENTS AND FUTURE APPLICATIONS. (EXHIBIT D)

PART OF ISSS INCLUDES THE SUPPORT SYSTEM COMPUTER COMPLEX (SSCC) AT THE FAA'S TECHNICAL CENTER (FAATC). IT CONSISTS OF A LARGE TYPICAL JOB SHOP SYSTEM THAT SUPPORTS PROGRAMMERS IN DEVELOPING AND MAINTAINING FIELD-DEPLOYED SYSTEMS. THIS CONFIGURATION INCLUDES A POOL OF SWITCH-CONFIGURABLE COMMON CONSOLES, GATEWAYS, LOCAL COMMUNICATIONS NETWORKS (LCNS), TOWER POSITION CONSOLES, ETC., EQUIPPED TO REPLICATE THE LARGEST OF ANY TWO FIELD-DEPLOYED SYSTEMS OF ANY TYPE. THIS EQUIPMENT WILL BE USED FOR SYSTEM TEST AND PROBLEM DETERMINATION AT THE FAATC. SIMULATION DRIVERS AND TEST TOOLS ARE PROVIDED, AS WELL AS CAPABILITIES TO MANAGE AND CONTROL MULTIPLE RELEASES OF THE FIELD-DEPLOYED SYSTEMS. EXCEPT FOR THE JOB SHOP HARDWARE/SOFTWARE AND THE SPECIAL FAATC UNIQUE SWITCHES AND SIMULATORS, THE SSCC CONTAINS THE SAME COMPONENTS AS THE FIELD-DEPLOYED SYSTEM.

THE SUPPORT SYSTEM COMPUTER COMPLEX FOR ISSS HAS BEEN DELIVERED AND INSTALLED AT THE FAATC ALONG WITH THE ISSS SUPPORT SOFTWARE. I WILL SAY MORE ABOUT ISSS LATER IN MY TESTIMONY.

TERMINAL ADVANCED AUTOMATION SYSTEM (TAAS)

THE TERMINAL ADVANCED AUTOMATION SYSTEM (TAAS) WILL MODERNIZE THE EXISTING TERMINAL RADAR APPROACH CONTROL

(TRACON) CAPABILITIES FOR APPROACH AND DEPARTURE CONTROL. TAAS WAS ORIGINALLY ARCHITECTED TO SUPPORT FULL CONSOLIDATION OF FACILITIES AND CERTAINLY WILL SATISFY THOSE REQUIREMENTS; HOWEVER, THE ARCHITECTURE IS FLEXIBLE ENOUGH THAT IT ALSO CAN BE SCALED DOWN TO ALLOW FOR TERMINAL AIR TRAFFIC CONTROL AT NON-CONSOLIDATED OR STAND-ALONE APPROACH CONTROL FACILITIES. IN 1988, CONGRESS REQUIRED THE FAA TO INCLUDE CONTRACT OPTIONS IN AAS THAT WOULD SUPPORT MANY CONSOLIDATION ALTERNATIVES. AS A RESULT, THE AAS CONTRACT INCLUDES AREA CONTROL FACILITIES (ACFS), ACF BS (WHICH ARE SIMILAR TO METRO-PLEX CONTROL FACILITIES (MCFS) TODAY), TAAS, AND TOWER/REMOTE TRACONS, WHICH COULD SUPPORT NON-CONSOLIDATED TERMINALS. AAS PROVIDES THE CONTRACTUAL VEHICLE TO SUPPORT ALTERNATIVES TO FULL CONSOLIDATION WITH PREVIOUSLY AND COMPETITIVELY NEGOTIATED OPTIONS. TAAS IS THE SYSTEM CONFIGURATION THAT THE DOD IS PARTICULARLY INTERESTED IN USING FOR ITS MILITARY APPROACH CONTROL FACILITIES.

DEVELOPMENT OF THE TAAS SEGMENT ALREADY HAS ADVANCED MULTI-SENSOR TRACKING TECHNOLOGY. A DISTRIBUTED TRACKING DESIGN FOR SURVEILLANCE PROCESSING THAT MAINTAINS HIGH TRACK ACCURACY EVEN IN THE EVENT OF PROCESSOR OR SURVEILLANCE SENSOR FAILURE HAS BEEN DEVELOPED. THIS IS ESPECIALLY IMPORTANT FOR HIGH DENSITY TERMINAL OPERATIONS.

The design and development of both hardware and new functional software for TAAS are basically on schedule and can be demonstrated in our development laboratory in Rockville. However, delays in ISSS software, some of which is reused in TAAS, will impact completion of TAAS factory tests by about seven months.

Tower Control Computer Complex (TCCC)

The TCCC design is perhaps the most innovative of all the AAS segments, since the Tower facilities today have very little automation. Some of you have seen the demonstration of voice recognition, as well as touch screen technology, to support the automation of flight data communications in the tower.

Here again, technology has been advanced. The accuracy of speech recognition was increased greatly by using a real-time grammar compiler. A control grip device was invented that allows the controllers to move a cursor and make selection from the screen, as well as interact with the speech recognizer and maintain radio communications -- all from the same hand-held mechanism. The TCCC will interface not only with TAAS, but, also with the Pre-departure Clearance (PDC) and the Terminal Doppler Weather Radar (TDWR) systems.

Full TCCC development has been curtailed by FY93 funding limitations. IBM has been directed to proceed only with development of a "Type III" capability. This will provide limited flight data handling, full status and control of airport equipment, and interface to the Pre-departure Clearance system, digital Automatic Terminal Information Service (ATIS) and Information Distribution System (IDS).

It is hoped that sufficient funding will be available in FY94 to enable continued development of the full TCCC system.

Area Control Computer Complex (ACCC)

The ACCC segment will complete the replacement of today's Host system. It will assist the controller with tactical conflict resolution and provide automated and continuous flight plan conflict detection -- often referred to as a "20-minute look ahead." ACCC will introduce many additional functions of interest to the airlines and other users, such as arrival and departure metering, and the use of real-time wind, temperature and atmospheric pressure for an improved flight planning process. Technological advances will support capabilities beyond anything now available. For example, alternative routes will be generated to avoid future conflicts, in which the route generation algorithms

FACTOR IN THE COST OF EXTRA TIME, DISTANCE AND FUEL FOR THE AIRCRAFT -- ALL IMPORTANT CONSIDERATIONS TO THE AVIATION INDUSTRY.

THE CRITICAL DESIGN REVIEW FOR ACCC WAS COMPLETED IN 1992 AS PLANNED. IT SHOULD BE NOTED THAT FULLY 73% OF THE ACCC SOFTWARE WILL BE REUSED OR CARRIED FORWARD FROM THE ISSS AND TAAS SEGMENTS. FY93 FUNDING CONSTRAINTS HAVE FORCED CURTAILMENT OF ALL BUT A SMALL PART OF ACCC DEVELOPMENT AND STOPPED WORK ON AERA (AUTOMATED ENROUTE AIR TRAFFIC CONTROL).

ISSS SCHEDULE PROBLEMS

SINCE THE PROTEST RESOLUTION AND THE FINAL AWARD OF THE CONTRACT TO IBM IN NOVEMBER 1988, ISSS HAS HAD TWO SCHEDULE DELAYS. IN DECEMBER 1990, A NEGOTIATED CONTRACT MODIFICATION DELAYED THE PROGRAM SCHEDULE 19 MONTHS. THIS DELAY RESULTED FROM IBM'S DIFFICULTY IN COMPLETING THE DERIVED REQUIREMENTS AND DEVELOPING THE SOFTWARE, AS WELL AS FROM NEW REQUIREMENTS ADDED BY THE FAA.

THE SECOND DELAY OCCURRED AT A POINT IN THE PROGRAM WHEN THE BULK OF THE ISSS SOFTWARE WAS BEING TESTED. OVER 1.1 MILLION LINES OF CODE HAVE BEEN DEVELOPED FOR ISSS. IN 1992, IBM

EXPECTED TO BE TESTING A STABILIZED SYSTEM. INSTEAD, WE ALLOWED FULLY 150,000 LINES OF THE 600,000 LINES OF OPERATIONAL SOFTWARE TO CHANGE. IN DIRECT RESPONSE TO THE FAA'S CURE NOTICE, IBM CONDUCTED AN INTENSE ANALYSIS OF THE PROBLEMS THAT CAUSED THE DELAY IN ISSS ACCEPTANCE.

A DETAILED ASSESSMENT OF THE SOFTWARE BUILDS IN BOTH 1991 AND 1992 SHOWED THAT A SIGNIFICANT PORTION OF THE SOFTWARE INTRODUCED IN THESE INCREMENTS RESULTED FROM CHANGES TO ELABORATED REQUIREMENTS. ALTHOUGH THE FAA'S SYSTEM LEVEL SPECIFICATION (SLS) CHANGED VERY LITTLE, THE INTERPRETED AND DERIVED REQUIREMENTS CHANGED MARKEDLY.

MANY OF THE REQUIREMENTS RESULTED FROM JOINT FAA/IBM WORK TO REFINE THE COMMON CONSOLE COMPUTER-HUMAN INTERFACE, PARTICULARLY FOR THE AIR TRAFFIC CONTROLLER POSITIONS. THERE HAVE BEEN A NUMBER OF ACTION TEAMS, WITH JOINT FAA AND IBM PARTICIPATION, WHOSE CHARTER WAS TO REVIEW THE OPERATIONAL SUITABILITY OF VARIOUS PARTS OF THE SYSTEM. FOR A SYSTEM WITH HIGH SAFETY REQUIREMENTS AND A LARGE AND DIVERSE SET OF OPERATIONAL USERS, ACHIEVING CONSENSUS WAS OFTEN DIFFICULT AND TIME-CONSUMING. ABSORBING THE ACTION TEAMS' RECOMMENDATIONS INTO THE ISSS BASELINE CONSUMED A SIGNIFICANT PORTION OF IBM'S ENGINEERING AND MANAGEMENT RESOURCES AND DELAYED THE COMPLETION OF SOFTWARE DEVELOPMENT AND INTEGRATION.

As the program fell behind schedule, some of IBM's internal processes were affected by the pressure to meet dates. For example, a thorough technical review of the program in December revealed the need for additional diagnostic and simulation tools to automate more fully the extensive testing of the system. These problems are of concern to IBM, but they can be fixed, and we have already taken steps to do so.

The AAS program is of paramount importance to the Federal Systems Company. In December, I assumed the role of AAS program manager. Other management changes were made to focus on the top priority of fixing the ISSS schedule problem. We consolidated our test organization to eliminate inefficiencies and we are carefully limiting software changes to only those that are mandatory. Additional diagnostic and simulation tools have been integrated into our tool set, and plans exist to continue to expand that capability. Several internal audits have been conducted in all parts of the organization. Let me emphasize that none of the reviews have found any fundamental flaw in ISSS. We believe the architecture is sound. We must simply channel our effort toward completing the testing and achieving schedule.

The FAA Technical Center acceptance milestone has been re-planned with the FAA and is now scheduled for September

1994, A 14-MONTH DELAY. THIS REVISED DATE ACCOMMODATES RESTRUCTURING OF FORMAL TEST, TRANSITION TO AN UPGRADED RISC/SYSTEM 6000 PROCESSOR, RELOCATION OF THE TEST PROGRAM TO THE FAA'S LABORATORY EXPANSION BUILDING AND THE ENGINEERING, DEVELOPMENT AND TEST OF ADDITIONAL CAPABILITIES NEEDED FOR DEPLOYMENT CALLED BLOCK UPDATE 2.

SUCCESSFUL COMPLETION OF ISSS REQUIRES CORRECTIVE ACTION BY BOTH THE FAA AND IBM. CONFIDENCE IN THE ABILITY TO MAKE SCHEDULE DEPENDS DIRECTLY ON THE COMPLETENESS OF KNOWN REQUIREMENTS AND THEIR UNDERLYING ASSUMPTIONS. TOGETHER, FAA AND IBM MUST BALANCE THE CONFLICTING DEMANDS OF REQUIREMENTS CHANGES, SCHEDULE AND COST. IMPORTANT TRADE-OFFS WILL BE NEEDED IN THE FUTURE, BETWEEN REQUIREMENTS ISSUES TO FIELD THE SYSTEM AND ACHIEVING THE EARLIEST POSSIBLE OPERATIONAL SCHEDULE.

FINANCIAL EFFECTS

FROM A FINANCIAL POINT OF VIEW, IBM IS NOT BENEFITING FROM THE ISSS SCHEDULE DELAYS. SINCE ISSS IS A FIXED PRICE INCENTIVE CONTRACT, WE ARE HIGHLY MOTIVATED TO COMPLETE ISSS AS QUICKLY AS POSSIBLE.

THE AAS ARCHITECTURE IS THE RIGHT APPROACH

THE AAS ARCHITECTURE IS THE RIGHT APPROACH FOR THE UNITED STATES AIR TRAFFIC CONTROL SYSTEM. IN THE PAST, ALL ATC SYSTEMS HAVE BEEN LIMITED IN THEIR ABILITY TO RESPOND TO CHANGING NEEDS DUE TO LIMITED EXPANSION CAPABILITY, RECONFIGURATION LIMITATIONS IN DESIGN, AND RAPID TECHNOLOGICAL OBSOLESCENCE OF HARDWARE. THE AAS ARCHITECTURE SPECIFIED BY FAA WILL AVOID THESE KINDS OF PROBLEMS IN THE FUTURE. THE RESULT WILL BE A SYSTEM THAT IS MORE RESPONSIVE TO THE EVOLVING NEEDS OF AVIATION.

USERS WILL BENEFIT FROM THE AAS PROGRAM

BEGINNING WITH THE DEPLOYMENT OF ISSS, SIGNIFICANT BENEFITS WILL ACCRUE TO THE AIRLINES AND OTHER USERS OF THE AIR TRAFFIC SYSTEM.

ISSS WILL ELIMINATE THE PRESENT HOST-DISPLAY CHANNEL HARDWARE LIMITATIONS THAT CONSTRAIN THE FAA'S CAPABILITY TO ADD NEW CONTROL SECTORS IN THE ARTCCS. IN CONJUNCTION WITH THE VOICE SWITCHING AND CONTROL SYSTEM, ISSS WILL PROVIDE THE FLEXIBILITY AND CAPACITY THAT ENABLES FAA TO ADJUST SECTORIZATION TO ACCOMMODATE INCREASED LEVELS OF TRAFFIC AND CHANGES IN TRAFFIC FLOWS, WHICH OCCUR WHEN NEW HUB AND SPOKE OPERATIONS ARE ESTABLISHED.

FURTHER, THE ISSS ARCHITECTURE PROVIDES INCREASED REDUNDANCY WHICH ENABLES EQUIPMENT MAINTENANCE, EITHER PLANNED OR UNPLANNED, TO BE DONE WITHOUT TAKING THE SYSTEM OFF-LINE. THIS PROVISION CAN AVOID THE KIND OF DELAYS THAT MAY ACCOMPANY AN EQUIPMENT OUTAGE IN THE PRESENT SYSTEM. IT IS ESPECIALLY SIGNIFICANT AT ARTCCS WITH HEAVY AIR FREIGHT NIGHT-TIME OPERATIONS, WHEN PLANNED SHUTDOWNS FOR EQUIPMENT MAINTENANCE ARE REGULARLY SCHEDULED IN TODAY'S SYSTEM.

THE TAAS SEGMENT WILL GREATLY IMPROVE SURVEILLANCE PROCESSING, BY USING THE AIRPORT SURVEILLANCE RADARS, AS WELL AS INPUTS FROM LONG RANGE ENROUTE RADARS, THAT HAVE COVERAGE OVER THE TERMINAL AREA. THIS CAPABILITY WILL MINIMIZE DELAYS THAT CAN OCCUR TODAY IN THE EVENT OF EQUIPMENT OUTAGE IN AIRPORT SURVEILLANCE RADARS.

THE COLOR DISPLAYS IN TAAS WILL IMPROVE THE PRESENTATION OF WEATHER AND TURBULENCE INFORMATION FOR THE TERMINAL AREA BY USING INPUTS FROM ASR-9 RADAR WEATHER CHANNELS. WHEN TCCC IS IMPLEMENTED, IT WILL INTERFACE WITH THE NEW TERMINAL DOPPLER WEATHER RADARS, WHICH SHOULD IMPROVE THE EFFICIENCY AND SAFETY OF TERMINAL OPERATIONS DURING SEVERE WEATHER CONDITIONS.

ACCC WILL INCREASE THE CAPABILITY OF THE AIR TRAFFIC CONTROL SYSTEM TO SUPPORT USER REQUESTS FOR DIRECT FUEL-EFFICIENT ROUTING, AS WELL AS PROVIDE AN IMPROVED SYSTEM PLATFORM FOR

ACCOMMODATING TECHNOLOGIES, SUCH AS DATA LINK AND AUTOMATED DEPENDENT SURVEILLANCE, USING SATELLITE NAVIGATION SYSTEMS.

OVERALL, THESE IMPROVEMENTS ARE EXPECTED TO SIGNIFICANTLY IMPROVE EFFICIENCY AND SAFETY OF AIR TRAFFIC CONTROL FOR ALL USERS OF THE SYSTEM. MOREOVER, THE SYSTEM WILL BE MORE RESPONSIVE TO THE FUTURE NEEDS OF USERS, DUE TO THE EXTENSIBILITY OF THE AAS SYSTEM ARCHITECTURE AND THE ADAPTABILITY OF THE CONTROLLER CONSOLE DISPLAYS.

CONCLUSION

IBM BELIEVES THAT THE FAA HAS ESTABLISHED AN AAS ARCHITECTURE THAT WILL BE A WORLD LEADER IN AIR TRAFFIC CONTROL WELL INTO THE 21ST CENTURY. THE FUNDAMENTAL DIRECTION AND PLANNED IMPLEMENTATION STEPS OF AAS ARE SOUND. THE PROGRAM SHOULD CONTINUE TO RECEIVE THE SUPPORT OF THE CONGRESS.

IF THE FAA AND IBM CAN JOINTLY SPEED THE DECISION MAKING ON REQUIREMENTS, AND IF WE CAN CONTINUE TO SHARPEN OUR FOCUS ON SCHEDULE COMMITMENT, I BELIEVE COST CONTAINMENT WILL FOLLOW.

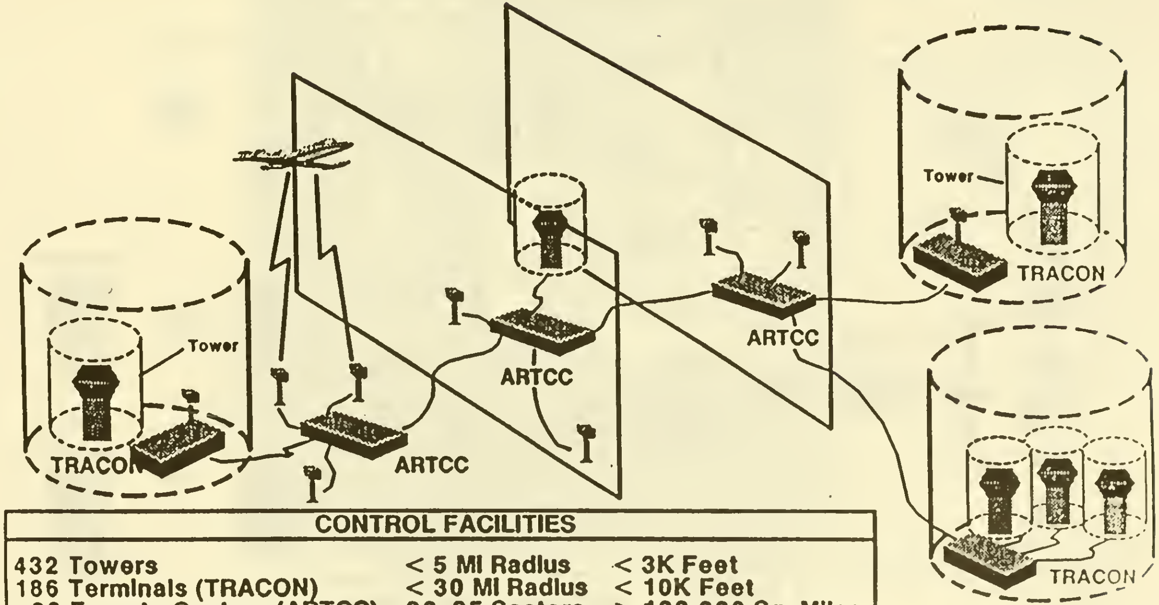
IBM HAS MADE CHANGES. OUR PRIORITY IS TO DELIVER A QUALITY PRODUCT THAT MEETS BASIC CONTRACT REQUIREMENTS ON SCHEDULE. THE PROGRAM IMPACT OF ANY REQUIREMENTS CHANGES WILL BE

CLEARLY VISIBLE TO BOTH IBM AND FAA MANAGEMENT. THE RECENT FAA ORGANIZATIONAL CHANGES ALSO PROVIDE AN OPPORTUNITY FOR IMPROVED DECISION MAKING. TAKEN TOGETHER, I BELIEVE THAT THE FAA AND IBM CAN MANAGE THIS PROGRAM TO A SUCCESSFUL CONCLUSION.

YOU HAVE MY PERSONAL COMMITMENT AND THE COMMITMENT OF THE IBM FEDERAL SYSTEMS COMPANY THAT ALL NECESSARY RESOURCES WILL BE APPLIED TO ACHIEVE THAT GOAL.

ADVANCED AUTOMATION PROGRAM

Today's Air Traffic Control System



CONTROL FACILITIES		
432 Towers	< 5 MI Radius	< 3K Feet
186 Terminals (TRACON)	< 30 MI Radius	< 10K Feet
23 Enroute Centers (ARTCC)	30-35 Sectors	> 100,000 Sq. Miles

Exhibit A

ADVANCED AUTOMATION PROGRAM

FAA Replacement Strategy

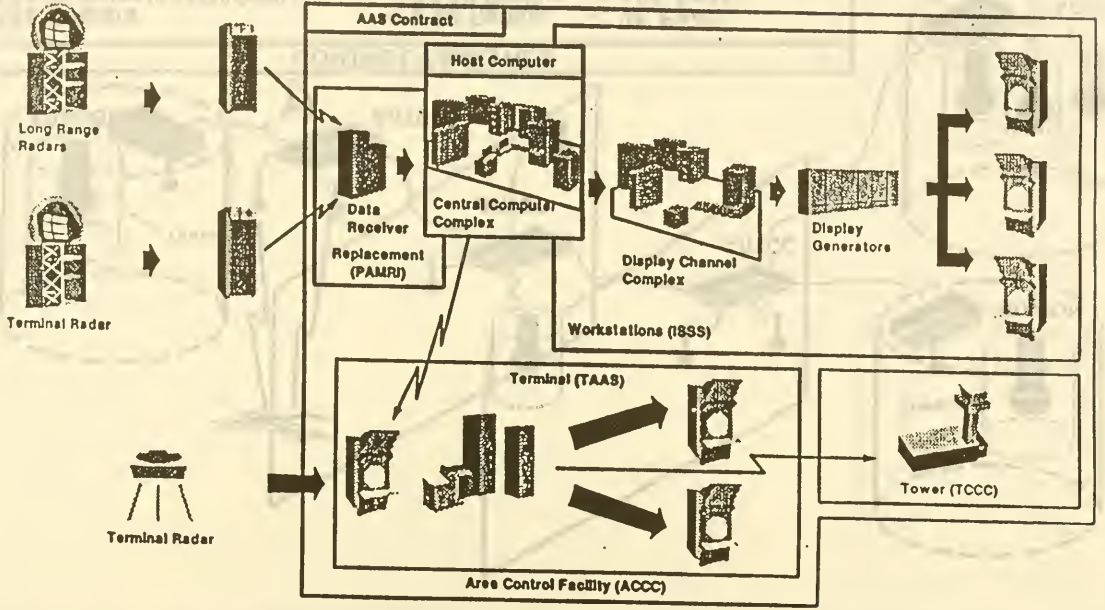


Exhibit B

AAS COMMON CONSOLE

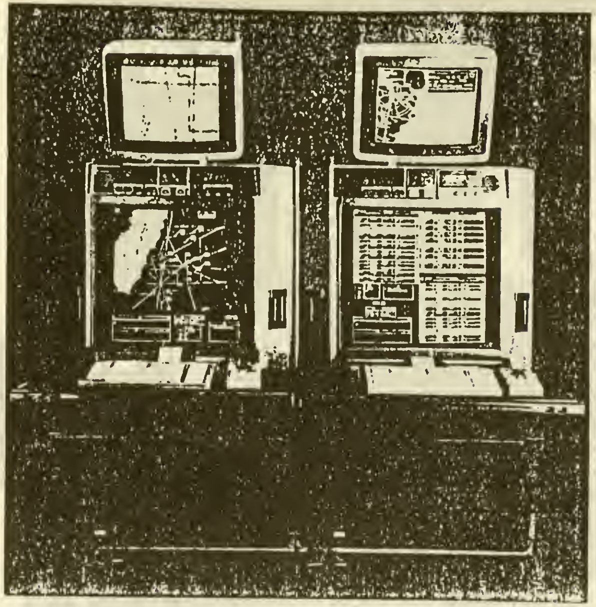
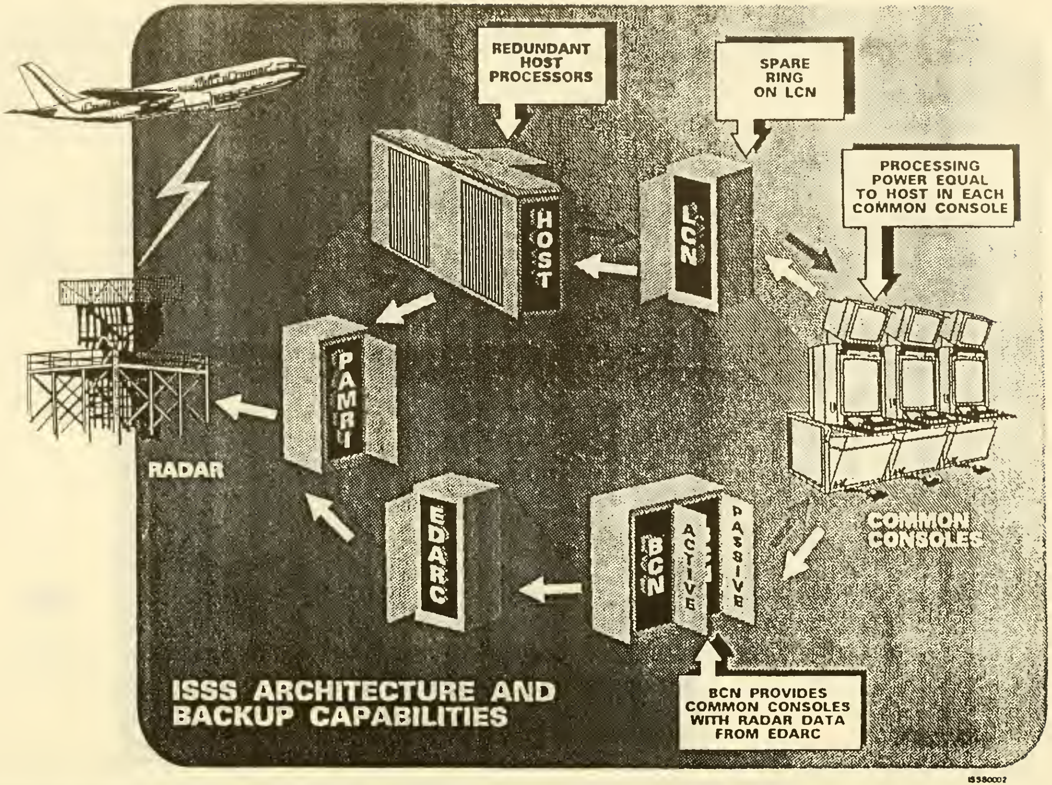


Exhibit C



ISSS ARCHITECTURE AND BACKUP CAPABILITIES

REDUNDANT HOST PROCESSORS
SPARE RING ON LCN
PROCESSING POWER EQUAL TO HOST IN EACH COMMON CONSOLE
HOST
LCN
PAMRI
EDARC
BCN
ACTIVE
PASSIVE
RADAR
COMMON CONSOLES
BCN PROVIDES COMMON CONSOLES WITH RADAR DATA FROM EDARC
1S380002

Exhibit D

PROFESSIONAL AIRWAYS SYSTEMS SPECIALISTS

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Phone: (305) 779-7277
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Howard E Johannssen, *President/Chairman*
Marvin E "Bud" Long *Vice President/Vice Chairman*

A Division of District No. 1—MEBA/NMU (AFL-CIO)

TESTIMONY OF HOWARD E. JOHANNSSEN, CHAIRMAN
PROFESSIONAL AIRWAYS SYSTEMS SPECIALISTS (PASS)
BEFORE THE
HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION
SUBCOMMITTEE ON AVIATION

MARCH 10, 1993

Mr. Chairman and Members of the Subcommittee:

I thank you for the opportunity to testify before you today. Our organization is greatly concerned with the continuing successful implementation of the Federal Aviation Administration's Advanced Automation System Project (AAS).

The Professional Airways Systems Specialists (PASS), a Division of District No. 1 - MEBA/NMU, is the exclusive representative of more than 10,000 safety related employees of the Federal Aviation Administration. They include Flight Standards Aviation Safety Inspectors (AFS), Office of Aviation Systems Standards Flight Check Pilots and Crew (AVN), and Airways Facilities (AF), the employees responsible for the installation, maintenance, repair and certification of the equipment used within the National Airspace System (NAS). These Aviation System Specialists are those most affected by the Agency's Advanced Automation System Project.

The Advanced Automation System includes interim enhancements and future replacement of existing equipments and structures. This transition involves thousands of major and minor changes in a live systems environment. As the transition continues our members must train for the new technology, while maintaining the existing systems and equipment to an extremely high degree of reliability. It is becoming close to impossible for the Systems Specialists to sustain this reliability.

Maintaining the existing National Airspace System is becoming increasingly difficult. Over the last five years, technical problems in the automation systems in use at Air Route Traffic Control Centers have increased dramatically. Replacement parts are hard to come by, or are no longer available. Scheduled outages requiring corrective actions on these systems have increased, as have unscheduled outages. Simply said, "We are holding this system together with twine and bailing wire."

Most of the existing computer equipment in use at the Air Route Traffic Control Centers (ARTCC) was installed in the mid 1970's, and is a product of 1960's technology. The DCC (Display Channel Complex) is no longer supply supported. Spare parts must come from existing supplies at the facilities, or must be specially ordered. Scheduled outages requiring corrective maintenance have more than doubled, creating an increased workload on the already short staffed Systems Specialist work force.

The Computer Display Channel (CDC) equipped Air Route Traffic Control Centers at Atlanta, Miami and Houston have no room for expansion. There has been a sixty percent increase in maintenance actions overall for this equipment. Again, this aging equipment is causing an increased strain on an already overtaxed technical work force.

We feel that scrapping the entire plan for the Advanced Automation System and continuing with the present system is not a viable option. The technical workforce is already taxed to it's limit. Most of the remaining experienced Systems Specialists who maintain the existing automation equipment within the National Airspace System are near or past retirement age. By the FAA's own projections, almost sixty percent of the Automation Technicians will retire before 1998. Even if the FAA were to be allowed to hire the necessary additional Systems Specialists, and to replace those retiring, it would require extensive training and experience to maintain these systems. The existing system is deteriorating, and we believe the necessary level of reliability cannot be maintained through the next decade.

Despite the present problems with the delays in the Advanced Automation System, the initial phase has proceeded well ahead of schedule. The Peripheral Module Replacement Item, which replaced the Radar Data Acquisition Subsystem (RDAS), Data Receiver Group (DRG), and the Radar Multiplexer (RMUX) at the Centers, has increased the input capability and speed of the automation systems. We understand that this is only the first step in the planned transition to the Advanced Automation System. However, it is working well and a complete "start over" of the AAS project at this point would not be practical. That would leave the current, problematic equipment in place longer while the design of new hardware and software is developed from ground zero. The FAA and our members would still be faced with holding an antiquated system together with too few people and inadequate resources.

As you are aware, we have testified over the last several years on the effect that inadequate technical staffing, both in Operations and Facilities and Engineering (F&E), would have on the NAS Modernization. In part, the delays in the development and deployment of this and other systems are a result of the FAA's failure to address its technical staffing requirements.

However, the responsibility must also be shared with Congress and the previous Administrations. The continued failure to hire technical personnel and delays in delivering AAS and other equipment is no secret. As President Clinton recently said, " We need a change in America." And he is absolutely correct. This Congress also needs to change. This Congress must begin to act on what is urgently needed. Our nations economy, defense and world competitiveness depends on a safe, reliable and productive aviation system. If this Congress does not address the problems we speak of here today, than we will have lost an opportunity to achieve the goals laid out by the new Administration.

We do know that the FAA and IBM cannot continue on the present course of the Advanced Automation program without change. PASS supports the projected delay in development, and the redefinition and new direction of the project. Any new hardware and software systems introduced in the National Airspace System must meet stringent requirements in order to insure the safety of the system. These systems must be proved reliable before dismantling what is now in place. We provide the largest and safest Air Traffic Control system in the world, and new systems must meet or enhance that level of operation.

It is imperative to remember that FAA cannot continue to eliminate technical positions based on the supposed efficiency of equipment that is not yet in place. The AAS will arrive at least, if not more than, three years behind schedule. By today's standards, FAA has too few Systems Specialists to maintain the system. GAO stated in their testimony in April of last year that the FAA needed to increase its field maintenance work force by 3,000 positions over current levels. This void of necessary talent must be filled now, and requirements reevaluated once new systems are installed and operational.

Again, thank you for the opportunity to testify. At this time I would be happy to answer any questions you may have concerning the Advanced Automation System and it's impact on our members.

United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Aviation,
Committee on Public Works and Transportation,
House of Representatives

For Release on Delivery
Expected at
10:00 a.m. EST
Wednesday
March 10, 1993

AIR TRAFFIC CONTROL

Advanced Automation System Problems Need To Be Addressed

Statement of Allen Li,
Associate Director, Transportation Issues,
Resources, Community, and Economic
Development Division

Mr. Chairman and Members of the Subcommittee:

We are pleased to testify today on the Advanced Automation System (AAS)--the largest project in the Federal Aviation Administration's (FAA) program to modernize the nation's air traffic control system. As currently envisioned, AAS will be installed in five distinct segments and will replace and enhance controllers' work stations and supporting automation systems throughout the country. The estimated cost of AAS rose from $2.5 billion in 1983 to $4.8 billion when the production contract was signed with International Business Machines Corporation (IBM) in 1988. The current cost estimate is $5.1 billion. Over the years, we have periodically reported on the cost and schedule problems and risks associated with FAA's acquisition of AAS. In our testimony today, we will describe the current AAS schedule and cost problems, causes of these problems and future uncertainty, and key AAS issues that will face the new leadership at FAA. This statement is based upon past reports, our ongoing AAS review for the House Appropriations Committee's Subcommittee on Transportation and Related Agencies, and an analysis of recent developments. (See appendix III for a list of related GAO products.)

In summary, we found that

-- Schedule and cost problems have worsened over the past year. Last week, FAA and IBM agreed on a 14-month delay--first proposed by IBM in November 1992--for a key initial segment of AAS. The total delay in this segment is now about 3 years from the milestones established in 1988. Because of recent problems, the cost of AAS may increase by another $235 million. In addition, delays in AAS have forced FAA to initiate several costly interim projects to sustain the current air traffic control system.

-- Several major factors have led to the current schedule and cost problems and have created uncertainty over the future of the project. First, FAA and IBM significantly underestimated the effort required to develop AAS--a highly complex technological undertaking. As a result, FAA and IBM set schedules that proved unrealistic when IBM encountered technical difficulties. Second, FAA did not provide needed oversight of IBM's performance. For example, FAA did not have good quantitative information on IBM's progress in software development. Third, FAA was indecisive in resolving some basic requirements issues. One basic unresolved issue is the extent of consolidation of air traffic control facilities, which will be an important variable in determining how many facilities receive AAS equipment. We believe the frequent turnover in Administrators at FAA--9 in the last 10 years--has contributed to the delay in reaching a consolidation decision.

-- Given problems experienced over the past 5 years and likely changes in FAA's consolidation plan, FAA faces two challenges; namely, addressing immediate schedule and technical problems and determining whether the plan for each segment of AAS is the most appropriate way to meet the needs of the air traffic control system. FAA has been reviewing the AAS project, and the Secretary of Transportation is also considering a review of AAS. In our opinion, any strategy arising from such reviews would be most effective if it contained the following four elements: (1) establishing realistic schedules, (2) reaching more-timely closure of requirements issues, (3) submitting a firm consolidation plan, and (4) critically evaluating the current plan and need for each segment of AAS.

We would now like to discuss in more detail the AAS project, the problems that FAA and IBM have encountered, and key AAS issues that need to be addressed.

BACKGROUND

AAS will provide a new automation system that includes improved work stations for controllers, computer software, and processors. It is being developed to replace current equipment and to allow the air traffic control system to accommodate forecasted increases in traffic through the use of modern equipment and advanced software functions. AAS is a complex technological project containing several million lines of programming code, extensive computer-human interface, and stringent requirements for performance and reliability.

FAA's air traffic control mission is to promote the safe, orderly, and expeditious flow of aircraft. Air traffic controllers maintain separation between aircraft by utilizing information processed by computers and displayed on video screens at controllers' work stations. FAA uses three types of facilities to control aircraft: airport towers, terminal facilities, and en-route centers. Airport towers control aircraft on the ground and in the vicinity of the airport. Terminal facilities sequence and separate aircraft from the point at which tower control ends to about 20 to 30 miles from the airport. At that point, en-route centers assume control of the aircraft and maintain control until the aircraft enters terminal airspace at its destination.

AAS is scheduled to replace computer hardware and software and controller work stations at en-route centers, terminals, and towers. The project was originally designed to accommodate the consolidation of FAA's current 230 terminals and en-route centers into 23 facilities. Although a final decision has not yet been made, FAA is leaning towards a much less ambitious consolidation strategy that would result in about 200 terminal and en-route facilities.

FAA introduced the AAS project in 1983 and decided to pursue a two-phase acquisition strategy. First, the agency awarded competitive design contracts to IBM and Hughes Aircraft Company in 1984. FAA expended about $700 million during this first phase. In 1988, FAA awarded a contract to IBM to complete the second acquisition phase, namely the development and production of AAS.

In 1983, the total cost estimate for AAS was projected to be $2.5 billion and completion was scheduled for 1996. When the contract with IBM was signed in 1988, FAA estimated the project would cost $4.8 billion and be completed in 1998. Since that time, the projected costs have increased to $5.1 billion, and the estimated completion date has slipped to 2002.[1] Appendix I provides FAA's figures on how the actual and estimated appropriations for AAS are currently allocated. As indicated in the appendix, about 47 percent of the estimated funds for AAS, or $2.4 billion, have not yet been appropriated.

AAS Will Be Implemented In Five Segments

As currently defined in the production contract, FAA and IBM will implement the system in five segments. The first segment is the Peripheral Adapter Module Replacement Item (PAMRI), which will replace existing communications equipment that connects en-route centers with external systems, such as radars. In addition to replacing the aging Peripheral Adapter Module equipment, the PAMRI will provide increased interface capabilities with external

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[1] These cost estimates include actual and anticipated appropriations for FAA's Research, Engineering, and Development and Facilities and Equipment accounts.

systems. The PAMRI segment is almost completed; 18 of 20 sites are operational.

The second segment of AAS is the Initial Sector Suite System (ISSS). ISSS will be installed at the nation's 20 continental en-route centers. It will replace mechanical flight strip printers,[2] controller display screens, and associated display processing systems with state-of-the-art color display work stations called common consoles, new software, and modern computer communications networks. ISSS will interface with the primary computer system used by en-route centers, known as the Host computer. ISSS is a critical segment of AAS because hardware and software being developed for later segments will be based upon ISSS. Thus far, most work by FAA and IBM has been on the ISSS segment of the project.

The third AAS segment is the Terminal Advanced Automation System (TAAS). TAAS will replace the Automated Radar Terminal System (ARTS), which is the main computer system used at terminal facilities for controlling approaching and departing aircraft. TAAS will also provide new controller work stations to replace existing radar screens. TAAS will incorporate hardware elements (including common consoles), networks, and software already developed for ISSS. One difference between TAAS and ISSS is that ISSS does not involve the replacement of a primary computer system.

The fourth segment of AAS is the Tower Control Computer Complex (TCCC). At selected airport towers, TCCC will replace radar displays and paper flight strip systems with new work stations for tower controllers. TCCC will also provide towers with the capability to better interface with terminal facilities.

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[2] Flight strips provide controllers with basic status information, such as aircraft routes, altitudes and air traffic clearances. Controllers presently mark up the paper versions to record changes in status and to coordinate information with each other. Each strip provides information on one flight.

The fifth and final step in the evolution to full AAS is the Area Control Computer Complex (ACCC). ACCC is designed to replace the PAMRI and the Host computers used by en-route centers and to combine the en-route (ISSS) and terminal (TAAS) systems into what FAA calls an Area Control Facility. ACCC is also expected to provide new advanced software functions, known as Automated En Route Air Traffic Control (AERA). FAA expects AERA functions to allow controllers to handle more planes and to grant more aircraft requests for routes requiring less fuel.

SCHEDULE AND COST PROBLEMS HAVE WORSENED

Since its introduction in the 1983 National Airspace System Plan, the AAS project has experienced significant schedule delays and cost growth. These problems have grown more serious during the past year. Schedule delays have led FAA to initiate costly interim projects and will defer anticipated benefits further into the future.

Schedule Problems Have Become More Acute

In November 1992, IBM announced a 14-month delay in ISSS--a key initial segment of AAS. This brought the total estimated delay in this segment to about 3 years over the milestones set in the 1988 contract. In its announcement, the contractor stated that it would be unable to meet the schedule for factory testing of the ISSS segment of AAS. In response, FAA sent a "cure" notice to IBM stating that the proposed delay was detrimental to the agency and that FAA might terminate the contract if IBM did not provide an adequate plan for addressing the problems. IBM responded with a plan in December 1992. Last week, FAA and IBM agreed on a new schedule for the AAS segment incorporating the 14-month slip.

Other segments of AAS have also experienced schedule problems. For example, FAA officials recently indicated that the TAAS segment will be delayed an additional 5 to 7 months, for a total delay of about 2 years from the milestone set in the contract.

The Cost of AAS Has Grown

FAA's current estimated total cost for AAS is $5.1 billion, an increase of 6 percent since 1988. Furthermore, the agency has identified about $235 million in additional costs that may eventually have to be added to the total cost of the project. These additional costs are due to underestimation by FAA and IBM of the work needed to produce operationally suitable ISSS and TAAS. While FAA officials told us they hoped to take action to offset this increase, they could not provide us with any concrete cost savings for AAS.

Additionally, FAA is considering other changes to AAS which may alter the agency's total cost estimate for the project. For example, FAA plans to change the design and quantities of equipment for the tower (TCCC) segment. Also, likely changes to FAA's facility consolidation plans would require FAA to exercise some contract options not yet factored into its cost projections for AAS. FAA is unsure whether these changes will increase or decrease costs for AAS.

Delays In AAS Have Led to Costly Interim Projects

Because of delays in AAS, FAA has been forced over the years to start some costly interim projects to sustain and enhance current hardware and software. For example, FAA initiated the $435 million Interim Support Program to bridge the gap between current and future automation systems at terminal facilities. Last year, FAA began an $80 million project to buy advanced versions of ARTS to install at some of its larger terminal facilities. Over the past few months, FAA has initiated additional plans for three projects to sustain its en-route centers until AAS can be installed. These three projects are estimated to cost over $200 million. For example, FAA plans to replace processors scheduled to be supplanted by ISSS at eight en-route centers. Costs for these interim projects are not included in the $5.1 billion estimate for AAS.

AAS schedule delays defer benefits to be gained by replacing this older equipment. Benefits are expected to accrue largely in the form of savings in time for passengers and reductions in fuel costs for airlines. The costs and benefits of each AAS segment are currently being evaluated by the Volpe National Transportation Systems Center, a unit of the Department of Transportation's Research and Special Programs Administration. Therefore, the amount of benefits being deferred by delays in AAS is uncertain.

SEVERAL MAJOR FACTORS HAVE LED TO CURRENT PROBLEMS AND CREATED UNCERTAINTY OVER THE FUTURE OF AAS

Several major factors have led to current problems and future uncertainty with the AAS project. In 1988 FAA and IBM agreed to an AAS design that was too ambitious and established schedules that proved to be unrealistic when IBM encountered technical difficulties. Also, FAA did not exercise adequate oversight of IBM's progress in software development. In addition, FAA has not been decisive in resolving basic requirements issues and the extent of consolidation of air traffic control facilities.

The Plan for AAS Was Too Ambitious

In our opinion, one of the major causes of the current AAS problems stems from the fact that FAA's initial plan was too ambitious. In the early 1980s, FAA decided to replace the fundamental hardware and software in en-route facilities, terminals, and airport towers in one large project over a period of 13 years. In addition, this project was to have been incorporated within a consolidation plan that would have affected every en-route and terminal facility in the country. Both FAA and IBM underestimated the effort required to replace key hardware and software components throughout the air traffic control system.

As a result of their misjudgment of the effort required for AAS, FAA and IBM set schedules which proved unrealistic when IBM encountered technical difficulties. The issue of unrealistic schedules was highlighted in an April 1992 Volpe Center report done at the request of the House Committee on Appropriations.[3] The Volpe report stated that overly aggressive schedules were overtaken by factors such as unresolved requirements, design rework, and software rework.

We have identified several unresolved development problems that have led to IBM's current difficulties in meeting agreed-to schedules:

-- System stability. An FAA project official described stability of the system as the most important issue facing the AAS project at this time. One aspect of this problem is that IBM has encountered difficulty in satisfying requirements for a large number of common consoles working together. The AAS contract requires ISSS to sustain 210 common consoles operating at peak load. At present, IBM has only been able to reach a level in which 56 common consoles work together for any significant length of time. The FAA AAS Program Manager attributed the stability problem to multiple causes, including the absence of adequate software testing tools at IBM.

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[3] "An Assessment of the Status and Technical Risk of Federal Aviation Administration's Advanced Automation System Software Development" (IR-MA-1298-2) Volpe National Transportation Systems Center and Intermetrics, Inc., April 1992.

-- Electronic flight strips. Automation of the current paper flight strip system may be the most difficult change for controllers to accept. Flight strips, which are currently printed by mechanical printers, contain information about an aircraft's route of flight, altitude, airspeed and destination. Controllers write on the strip to reflect changes in this information and to record instructions given to the pilots. En-route, terminal, and tower facilities all currently use paper flight strips, and AAS requires the replacement of all current systems with automated versions that will be displayed on the controllers' screens. Controllers will have to learn new motions, keystrokes, procedures, and display formats.

IBM has experienced difficulty in gaining controller acceptance of its automated flight strip system. As currently designed, electronic flight strips have been judged by user advisory groups as not "operationally suitable." FAA has not yet solidified the changes it believes are necessary to make the system suitable for operational use.

-- Reconstitution of the Host computer data base. Under ISSS, the Host computer will continue to supply flight data (and other information) to the ISSS common consoles. These common consoles will have their own processors with which controllers will be able to store and update data. As a result, in the event that the Host becomes inoperative and is not able to process and communicate data, the common console processors will be able to continue to update flight data independent of the Host. However, when the Host is reactivated, it will have a different set of flight data than will exist in the common console processors. The Host and the common console processors will not be able to work together if there are inconsistencies in their respective databases.

FAA Did Not Provide Adequate Oversight

Concerned about FAA's oversight of IBM's software development efforts, the April 1992 Volpe report recommended that FAA increase the number of staff positions within the project office's software development branch from three to between six and eight people. FAA has subsequently added two staff members to this branch. To enhance oversight further, FAA announced last week that it was placing the ISSS Program Manager on site at IBM.

The Volpe report also noted that the official schedule reports did not provide a realistic assessment of the amount of software development completed and remaining. Early in the contract, both IBM and FAA realized that the number of software builds--increments in which the software is built and tested--was inadequate. Therefore, they increased the number of builds from six to nine. As recently as last summer, FAA and IBM indicated that they were making good progress on ISSS because they were working on the last software build. However, as recognized in the Volpe report, this was a poor indicator of progress because testing for many key ISSS functions was deferred.

The Volpe Center recommended that FAA improve its schedule assessment process. An FAA project official stated that the agency has instituted an independent cost and schedule risk analysis capability which helped the agency identify part of the current ISSS schedule slips prior to IBM's November announcement of the 14-month delay in that segment. However, FAA still has a very limited capability for providing information on the real progress of software development. We asked for documentation that could be used to provide a quantitative assessment of IBM's progress in meeting ISSS requirements. FAA project officials stated that such information was not yet available, but the agency was trying to develop such performance measures.

FAA Has Not Been Decisive in Resolving Requirements Issues

FAA has experienced difficulty in resolving requirements for ISSS, which has contributed to the problems experienced by the project. The Volpe report addressed the issue of unresolved requirements. The report said that, in areas such as electronic flight strip definition and controller screen display formats, the lack of resolution of requirements issues implied high schedule and technical risk for ISSS. According to IBM project officials, the lack of clarity and decisiveness by FAA in resolving requirements issues is an important contributing factor to the AAS schedule problems.

The Volpe report recommended that FAA enhance the process for resolving ISSS requirements issues. One recent action taken by FAA has been to designate three top officials--from FAA's AAS program office and the Air Traffic and Airway Facilities units--to make final decisions on requirements issues.

Lack of a Consolidation Plan Creates Uncertainty

FAA has been indecisive regarding the extent to which it will consolidate en-route and terminal facilities scattered throughout the country. Until this decision is made, the AAS project office will not know how many facilities will receive AAS equipment and what capability will be required of that equipment.

FAA's original plan was to meld the 230 facilities into 23 Area Control Facilities. However, FAA now is leaning toward a "limited consolidation plan" which would consist of 22 en-route facilities with ISSS and/or ACCC, 10 large terminal Metroplex Control Facilities equipped with TAAS, and 170 other terminal facilities which would be upgraded but not with full TAAS systems.

Limited consolidation would represent a change in several technical and cost assumptions on which the TAAS and ACCC segments were based. For example, AAS was premised on having TAAS processors at 23 operational sites. Under limited consolidation, however, TAAS would be used at only the 10 large terminals, while flights at the other 170 terminals would be controlled by non-TAAS facilities. FAA is not yet sure of the impact of these changes on the cost of TAAS, but the amount of terminal airspace traffic controlled by TAAS software would be much less than expected. ACCC's design will also be affected by the decision on consolidation, since it is dependent on TAAS hardware and its requirements were based on a consolidation of terminals and en-route centers.

FAA has not yet delivered a facility consolidation plan to the Congress, despite direction from the House Committee on Appropriations that it do so by February 1, 1992. This plan is a key variable in FAA's acquisition strategy for AAS. As we noted in our recent transition report,[4] the leadership at FAA has changed several times over the last decade, during which the agency has had 9 different Administrators and Acting Administrators. We believe this turnover in leadership has contributed to the difficulty the agency has faced in reaching a consolidation decision.

IMPORTANT ELEMENTS OF STRATEGY FOR ADDRESSING AAS SITUATION

Given problems experienced over the past 5 years by FAA and IBM and likely changes in FAA's consolidation plan, FAA faces two

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[4] Transportation Issues (GAO Transition Series) (GAO/OCG-93-14TR, Dec. 1992).

different types of challenges: (1) addressing immediate schedule and technical problems and (2) determining whether the plan for each segment of AAS is the most appropriate way to meet the needs of the air traffic control system. Over the past few months, FAA has been reviewing its plans for AAS. Additionally, the Secretary of Transportation is now considering a review of the AAS project.

In our opinion, any strategy arising from these reviews would be most effective if it contained the following four elements: (1) establishing realistic schedules, (2) reaching more timely closure of requirements issues, (3) submitting a firm consolidation plan, and (4) critically evaluating the current plan and need for each segment of AAS. To make decisions about the future of the AAS project, the Department of Transportation and FAA will need more information on each AAS segment--including costs, schedules, benefits, and risks. More information on these issues should become available later this year. For example, the Volpe Center is expected to report on its cost/benefit analysis of the individual segments of the AAS in mid-1993.

In our ongoing work for the House Appropriations Committee, we are reviewing FAA's analysis of its automation needs. Although the segments of AAS share varying degrees of interdependence, our preliminary analysis indicates that individual segments could be canceled or modified while retaining many of the benefits of the other segments. Our observations on the impact of canceling AAS segments are provided in appendix II.

CONCLUSIONS

The AAS project is a very complex, ambitious undertaking. It involves substantial software development, changes how air traffic controllers use their equipment, and requires FAA to convert from old to new equipment while maintaining the highest standards of safety for the travelling public. Also, AAS is by far the most costly project in FAA's air traffic control modernization plan.

Given the substantial complexity and cost, we believe that FAA management must exercise closer supervision of IBM's progress and address schedule and technical problems in a more timely manner. Recently announced management initiatives must be carried through. Furthermore, in light of the problems experienced over the past 5 years and likely changes in FAA's consolidation plan, we think that FAA leadership must now address whether the current plan for each segment of AAS is the most appropriate way to meet the needs of the air traffic control system.

This concludes my prepared statement. I would be happy to answer any questions that you might have at this time.

AAS ACTUAL AND PROJECTED APPROPRIATIONS

(Dollars in millions on a fiscal year basis as of 3/1/93)

ITEM	1982-88		1989-93		1994-completion		Total cost	
	RE&D	F&E	RE&D	F&E	RE&D	F&E	RE&D	F&E
1. Design competition phase	417	277					417	277
2. Acquisition phase:								
Prime Contract:								
PAMRI						10		10
ISSS						450		450
TAAS						460		460
TCCC						424		424
ACCC/AERA						244		244
Not segmented		60		1,229		232		1,520
Total prime		60		1,229		1,820		3,108
Tech. support		20		234		256		509
Implementation support		22		94		212		328
Training				7		60		67
En-route center modernization				348		66		414
FAA in-house			19				19	
Subtotals	417	379	19	1,912	0	2,413	436	4,704
Total program	796		1,931		2,413		5,140	

Notes: (1) Columns may not add due to rounding.
(2) Funding for AAS has been provided through both the Research, Engineering and Development (RE&D) and Facilities and Equipment (F&E) accounts.

Source: FAA's Advanced Automation Program Office

GAO OBSERVATIONS ON AAS SEGMENTS

PAMRI: The PAMRI portion of AAS is almost completed. Significant savings would not result from terminating or modifying this segment.

ISSS: The equipment that FAA is most concerned about in the en-route environment are the controller screens and data processors, which are about 20 years old. FAA has an interim plan to replace the processors that support the Host computer at 8 of the 20 en-route centers. The agency has no active plans to replace the controller screens, but is testing various screens that may be capable of supplementing or replace current equipment.

ISSS is dependent only upon PAMRI; therefore, ISSS could be completed without the completion of the remaining segments. Completing ISSS under its current design would provide en-route controllers with new work stations, automated flight strips, and new data processors. The Host computers--which were installed in the late 1980s--would not be replaced.

TAAS: TAAS is designed not only to provide new work stations, but also to replace the Automated Terminal Radar Systems (ARTS), the main computer system currently supporting terminal facilities. FAA has upgraded various terminal facilities in terms of additional computer capacity and is replacing components such as keyboards to improve reliability. These upgrades will continue over the next few years. However, FAA does not believe these upgrades are a permanent solution. For example, the upgrades do not replace controller screens.

Termination of TAAS would affect the development of ACCC. FAA's original plan was to (1) install ISSS in an en-route center, then (2) consolidate a terminal facility by installing a TAAS system in the en-route center, and finally (3) modify the TAAS software to establish an Area Control Facility under ACCC. Without TAAS, there would be no TAAS software to modify for the main computer system for ACCC.

According to the AAS Program Manager, TAAS and TCCC can exist without the other. However, FAA expects to receive benefits from the two segments working in cooperation. They are expected to have a common software interface and share information, such as environmental data and the status of aircraft.

TCCC: FAA has already made plans to modify its original approach to TCCC. The project has been divided into two phases, the first of which replaces equipment that provides information on the airport environment. The second phase of TCCC would provide new consoles for tower controllers, including automated flight strips and new radar screens. Radar displays to be replaced by TCCC are relatively new, having been installed since 1989.

ACCC: A limited consolidation plan would change the original assumptions upon which ACCC was based; that is, to combine en-route and terminal air traffic control automation functions performed by ISSS, TAAS, and other terminal systems into an Area Control Facility. If TAAS is eliminated or changed significantly, ACCC becomes a segment focused on replacing the Host computer (the primary computer that will be supporting ISSS), and providing enhanced capabilities advanced software.

RELATED GAO PRODUCTS

Transportation Issues (GAO Transition Series) (GAO/OCG-93-14TR, Dec. 1992).

Air Traffic Control: Justifications for Capital Investments Need Strengthening (GAO/RCED-93-55, Jan. 14, 1993).

Air Traffic Control: Advanced Automation System Still Vulnerable to Cost and Schedule Problems (GAO/RCED-92-264, Sept. 18, 1992).

FAA Budget: Key Issues Need to Be Addressed (GAO/T-RCED-92-51, Apr. 6, 1992).

Air Traffic Control: Status of FAA's Modernization Program (GAO/RCED-92-136BR, Apr. 3, 1992).

Air Traffic Control: Software Problems at Control Centers Need Immediate Attention (GAO/IMTEC-92-1, Dec. 11, 1991).

Air Traffic Control: FAA Can Better Forecast and Prevent Equipment Failures (GAO/RCED-91-179, Aug. 2, 1991).

Air Traffic Control: Status of FAA's Modernization Effort (GAO/RCED-91-132FS, Apr. 15, 1991).

Air Traffic Control: FAA's Advanced Automation System Contract (GAO/IMTEC-91-25, Mar. 5, 1991).

Air Traffic Control: Continuing Delays Anticipated for the Advanced Automation System (GAO/IMTEC-90-63, July 18, 1990).

FAA Encountering Problems in Acquiring Major Automated Systems (GAO/T-IMTEC-90-9, Apr. 26, 1990).

Federal Aviation Administration's Advanced Automation System Investment (GAO/T-IMTEC-88-3, Apr. 12, 1988).

Air Traffic Control: FAA's Advanced Automation System Acquisition Strategy Is Risky (GAO/IMTEC-86-24, July 8, 1986).

GAO Questions Key Aspects of FAA's Plans to Acquire the Multi-Billion Dollar Advanced Automation System and Related Programs (GAO/IMTEC-85-11, June 17, 1985).

March 10, 1993

Statement of Jack Olcott
President, National Business Aircraft Association
before the Aviation Subcommittee
House Public Works and Transportation Committee
March 10, 1993

on behalf of the following organizations:

Air Freight Association
Air Line Pilots Association
Air Transport Association of America
Aircraft Owners and Pilots Association
Airport Consultants Council
Airports Council International - North America
American Association of Airport Executives
General Aviation Manufacturers Association
National Aircraft Resale Association
National Air Carrier Association
National Air Transportation Association
National Association of State Aviation Officials
National Business Aircraft Association
Sport Aircraft Manufacturers Association

Conclusions and Recommendations on the FAA Advanced Automation System Program

Since the announcement of the National Airspace System Plan in 1981, virtually the entire aviation industry has enthusiastically supported its early implementation. The Advanced Automation System program is a central element of the FAA system modernization. The industry has been greatly concerned about the problems this program has encountered, and by the erosion of the promised capabilities. At the same time we are well aware of the magnitude and complexity of the effort, and we recognize that the AAS will be perhaps the largest, most challenging, real-time, continuous-operation data processing system in the world.

The FAA Advanced Automation System, like many of the FAA National Airspace System Plan projects, is 4 to 5 years late. Why did it happen? It was a combination of many problems: optimistic schedules; lack of enough qualified FAA people; outside-contractors doing work, by default, which should be done by competent insiders; internal organization problems; management supervision lapses and serious policy mistakes; contract performance difficulties, and so on.

The AAS system was to be capable of accommodating full use of digital communications, and was to include AERA, the automated enroute air traffic control system, which would for the first time permit aircraft to be separated from other aircraft rather than from airspace sectors. AERA was to permit flexible, user-preferred routings while performing a growing number of routine ATC tasks automatically, thus introducing a far greater degree of flexibility into the system than was possible before. The AAS was to be able to accommodate a flow control system to overlie and smooth the traffic flows. It was to accommodate a series of automation functions as they were developed. AAS with these capabilities was to see first operational implementation by 1993.

Because it had been agreed that all significant automation functions were to become part of the AAS system, a number of worthwhile automation R&D projects were put off as the AAS delays began piling up. FAA found itself unable, because of the rigidities of the contracting process and rigidities it imposed on itself, to make rapid structural adjustments. What was done were frequent changes of specifications compensated for by time extensions, and reductions in deliverable capabilities.

There were other problems caused by the rapid change in technology, and yet other problems piled on. The idea of absorbing most if not all terminal facilities into the ATC centers ran into great opposition on manpower, operational, technical, and political grounds, and caused problems to the AAS by requiring a rigid design to be held open to accommodate any of various eventual solutions to the facility consolidation matter.

The contractions in AAS capability and each new delay has put the user benefits farther beyond reach. The sharp focus on satisfying FAA's internal desires has long subordinated the needs of the ultimate users of AAS - the airlines, general aviation and the military. Benefits to the nation have been delayed, possibly to the point of missing opportunities to achieve increases in capacity and efficiency that airspace users need badly. FAA's system management resulted in continually changing requirements which cascaded into delays and lesser system capabilities.

From the perspective of the customers for FAA's services, delays in AAS are serious indeed. The FAA National Airspace System Plan initiated in 1981-82 featured the Advanced Automation System as its central element, the one part of the NAS Plan which promised major system improvements to the users. The aviation community, in supporting the NAS Plan, realized that most of the projects were simply modernization and upgrading of FAA's aging facilities. Only when the terminal and enroute (AERA) automation and data link systems appeared would the users get real operational benefits.

What to do next

There is a long litany of problems. It would be easy to find fault and lay blame. But that is a fruitless pursuit and would simply create further delay and more costs. It is far better to lay out the work needed to achieve early tangible products in the field.

Representatives of several of the signatory organizations to this statement had the opportunity to meet with FAA's leadership a few days ago, to help us to better understand the dilemma and to consider a constructive way ahead. Our group found FAA's leadership to be fully open, well aware of the problems, and willing to be fully innovative in finding the proper way ahead.

FAA's Acting Administrator Del Balzo acknowledged that perhaps the most serious causes of the present situation were of FAA's own making. The most important has been the lack of active involvement of top management in the growing difficulties. While there has been much attention to FAA's acquisition/procurement problems, the leadership now acknowledges that FAA has not used the powers and the flexibility the laws and regulations allow to make needed changes as circumstances and the level of knowledge have changed. Top management did not adequately control the process of laying out and then controlling the requirements the contractor was expected to meet.

We believe that the steps now taken and announced by FAA are prudent and we support them, subject to the recommendations given later in this testimony, and assuming continuing vigilance and discipline to assure that valid controller and user concerns are accommodated without generating additional delays. A number of management improvements have been under way for perhaps two years, spurred initially by the then-Administrator, and now, in the last few weeks, expanded by the Acting Administrator. Yet we are also aware that FAA management has a history of changing very rapidly, for many reasons, and the beneficial changes can be erased by the stroke of a pen or by a turnover of the leadership. We believe the real challenge is to assure continuity of purpose and leadership to keep this program on the proper path.

Recommendations

There has been discussion of simply canceling the AAS contract and starting over. Our organizations believe this would be a great mistake, and would simply create more delays and more cost.

We believe that FAA must set, as it is trying to do, a clear baseline for its efforts, and make adherence to schedule and cost a primary goal. We agree that the proposed schedule of first operational commissioning of the Initial Sector Suite System in October 1996 is probably best that can be achieved, but we believe it must be strictly adhered to.

If such a firm baseline is set, we recommend that FAA restructure the AAS contract to permit the early completion of elements which can be fielded to achieve early benefits. If Congressional relief is needed to empower FAA to undertake such restructuring, we urge that such relief be given.

It is clear now that continuous, well-meaning changes in the details of what was actually wanted of the implemented AAS created a serious, self-imposed problem for FAA. From the beginning of the work FAA had used groups of controllers as well as the ATC organization management to assure that the system to be produced could be used by and would meet the needs of the controller community. The process went on far too long without crystallizing the design, and the learning processes and changing perceptions by successive groups of ATC people kept the system needs and specifications in flux, exacerbating delay and cost problems.

The long delays in the realization of automation benefits for the users have been exacerbated because FAA management at the very top did not play a sufficiently active management role. FAA managers considered, properly, the desires of the FAA ATC Service and the Facilities/Maintenance Service. However, they paid far less attention to meeting the needs of the users of the FAA system - the airlines, general aviation and the military.

This matter has dramatically slowed development and resulted in a lack of focus on the user benefits that should have been the primary objective. Yet first commissioning of real automation aids for controllers which will improve the system operation can't be allowed to be delayed until after 2000. Therefore,

1. We recommend that FAA establish an internal advocate for the needs of the FAA customers to balance these needs with the needs and wishes of the FAA organizations in the FAA inner management circles. We believe a "new contract" between FAA and the users is essential if user support for the program is to continue. We recommend that FAA, perhaps through this inside advocate, work with the user community on a quarterly basis, through the Advisory Committee structure or other mechanism. The "contract" must include regular reports and discussions concerning schedule and cost achievements as well as candid reviews of obstacles that are impeding timely deployment in the field.

Further, we recommend that FAA:

2. Proceed aggressively with the Interim Sector Suite System as the foundation for what is to follow, freezing requirements and resolve remaining open issues rapidly. Establish October 1996 as the firm date for first commissioning.

   If development and implementation of this system are to proceed sensibly, it is essential that the long delayed decision on FAA facility consolidation be made rapidly. Additional uncertainty, costs and delays must be expected if the consolidation decisions are further delayed.

3. Pursue aggressively the early implementation of the Automated Enroute Air Traffic Control System (AERA) and introduce the capability in Seattle immediately after commissioning of ISSS in order to provide valuable benefits to airspace users.

4. Proceed rapidly with the development of the Terminal Advanced Automation System (TAAS) as the appropriate system evolution for major terminals (TRACONS).

   Move rapidly to system decisions with respect to the right solution for smaller TRACONs, recognizing the benefits of using the same technologies and AAS contractual arrangements for these systems.

5. Pursue aggressively early implementation, on a tight time schedule, of the Terminal Area Traffic Control System, starting with the Center TRACON Automation System (CTAS) with first application on existing ARTS-III systems with digital displays, and plan on earliest possible national implementation of the TATCA capabilities (and related airport surface automation capabilities) on the TAAS.

6. Review, and reach decisions within 12 months, as to whether the Area Control Computer Complex (ACCC) and the Tower Control Computer Complex (TCCC) are still the best solutions. As needed, modify the system architecture to encompass the modified requirements.

There are other steps to be taken, beyond the decision on facility consolidation, if FAA and users are to have a sound planning base for the future. They are:

Decisions on the role of flow control and its relationship to ATC separation by AERA and follow-on.

Decisions on the role of digital communications (data link) in the FAA automation system and development of appropriate standards.

Decisions on the manner and the time that airborne Flight Management Systems/Area Navigation capabilities will be incorporated into the FAA system.

Decisions on a flexible system architecture which can accommodate Automatic Dependent Surveillance (ADS), enroute and terminal automation aids, and runway incursion/airport surface automation.

Decisions on the way AAS will be designed to provide weather products and services to pilots and controllers. The needed subsystems and peripherals must be developed and properly interfaced to ensure that the FAA system uses and provides the best, most current weather information.

We believe FAA could be helped on two other matters:

The rules for procurement imposed by the Office of Management and Budget (OMB), at their best, are intended to assure that technologies are mature, and that systems are fairly and competitively evaluated before procurement proceeds. The process, which injects elaborate rules and rigid "key decision points" on procurement decisions, was imposed at a time presidents were attacking Congress and the "spendthrift" agencies of government. OMB devised mechanisms to slow the buying and spending process. While the intent is to assure well-considered government spending and high-quality products, the reality is frequently just delay and less than up-to-date technology. FAA must be given the opportunity to use sound engineering judgement and common sense, and must not be hobbled by questionable processes and perpetual second-guessing.

The absence of an adequate number of in-house FAA technologists and managers has placed FAA in a position of not being able to properly manage and direct the work of its many support contractors. The present internal management structure has led to unconnected services being provided by multiple contractors, which in turn can lead to increased costs. FAA needs a highly competent corps of experts and managers to direct contractors and oversee the projects that will lead to a more efficient and modern aviation system.

Conclusion

The organizations for which I am speaking today support the dramatically refocused AAS program for FY-94, but it must be said that our patience and faith in FAA promises of program reform are limited. Good intentions are clearly present in FAA's current senior managers, but there has been a consistent pattern of failure and delay. We believe the funding for the AAS program for future years should be carefully monitored from the top and tied to results from the credible refocusing of the program.

At the same time, we believe it is extremely important that FAA not be micro-managed. They should be given the flexibility to achieve results on time and within cost. We also believe they should be held accountable for getting the program solidly on track. If they are unable to do so, the users will not be able to support continuation of the program and its escalating costs.

If the AAS program is to reach its objective of providing real benefits to the aviation system user, FAA must commit to a continuing real world assessment of user needs. This must be an ongoing process given the reality of technology evolution and the economic changes that are inevitable over the course of any multi-year development program.

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STATEMENT OF JOHN R. RYAN
VICE PRESIDENT - AIR TRAFFIC MANAGEMENT
AIR TRANSPORT ASSOCIATION
BEFORE THE AVIATION SUBCOMMITTEE
HOUSE PUBLIC WORKS AND TRANSPORTATION COMMITTEE
MARCH 10, 1993

My name is John R. Ryan, I am Vice President of Air Traffic Management of the Air Transport Association, which represents U.S. scheduled airlines.

I appreciate this opportunity to discuss our views on the Federal Aviation Administration's advanced automation program. Modernization, expansion and reliable operation of the ATC system are the keys to ensuring improved levels of safety in the future, as well as providing adequate aviation system capacity to meet future needs of the travelling and shipping public.

ATA member carriers have supported the National Aviation System (NAS) Plan, now called the Capital Investment Plan, since its inception. The program is fundamental to keeping the ATC system safe and to making it more efficient. Safety is important to the viability of the National Air Transportation System and we believe, as the records show, that the system is safe. But the system is not as efficient as it should be and that is equally important to the viability of the National Air Transportation System. One of the more important reasons the ATC system is not efficient is the lack of modern automation tools promised by the Advanced Automation System (AAS) which is severely behind schedule.

The Advanced Automation System design competition contract was awarded to IBM and Hughes in 1984. The production contract was awarded to IBM in 1988, 4 years later. The cost of the design competition phase of AAS was about 450 million dollars. Design competition has not been an effective tool for FAA procurement of major systems. FAA spent 80 million dollars in design competition for the "Host" computer contract. The production award for the host computer was 191 million dollars. Since the contract called for off-the-shelf equipment, the host contract should not have gone through the design competition phase. What's more, GAO recommended FAA continue the "Host" design competition for another year, which would have cost another 40 million dollars and further delayed implementation of the host computer system. Fortunately, FAA resisted the GAO recommendation and awarded the contract holding the design competition costs to 80 rather than 120 million dollars. It still took FAA 7 years from inception (1981) to last site implementation (1988) to complete the "Host" program.

In December 1990, IBM and FAA announced a 19 month slip in the AAS program schedule. The slip was due to additional requirements and the realization that the original schedule was unrealistic. The airline industry is appalled at the recent reports of another 14-month delay and of the FAA's continuing failure to field the Advanced Automation System on schedule. Completion of all phases of the advanced automation program has altogether been delayed from 1996 to 2002 and has increased in cost from $2.5 billion to about

$5 billion dollars. Mr. Chairman, it is important to note at this point that if the AAS program reaches its final conclusion as originally planned, it will have taken almost two decades.

This recent announcement of further delay has put the whole advanced automation program in jeopardy and it demonstrates the FAA's past inability to manage the requirements process. A program of this magnitude and importance requires the dedicated effort of the best that the government and computer industry have to offer and it is clear that in order to successfully implement such a program, increased oversight by top FAA and contractor management is necessary, including the introduction of tight discipline in the requirements setting process.

It is crucial that the most important phases of the Advanced Automation System continue and be supported by the industry and Congress. We cannot cancel the program and start all over.

We believe that the phases of the program which still can be implemented are: the initial sector suite system (ISSS) and the terminal advanced automation system (TAAS). These phases of the AAS are important to replacing old technology and providing the base system for future expansion. The first meaningful productivity improvement to AAS -- from the viewpoint of the airlines and other users -- is the advanced enroute automation phase known as AERA. The software program known as "Initial AERA Services" should be pursued in parallel with the ISSS and TAAS phases to be ready for implementation as soon as possible after ISSS and TAAS are delivered.

The TAAS program is likely to change rather dramatically due to the FAA's recent unannounced change in plans to not consolidate all the Terminal Radar Approach Control (TRACON) facilities into the 22 enroute Air Traffic Control Centers and the New York TRACON.

For many reasons, both technical and political, this consolidation goal is apparently no longer realistic. We believe that FAA now plans to consolidate some of their TRACONS (about 38) into 10 locations. They no longer intend to combine enroute and terminal air traffic control facilities. This will leave 170 small TRACON facilities that are not presently provided for in the TAAS plan. This is a crucial decision because it now requires FAA to rethink the automation solution for small TRACONS. The answer is definitely not to begin a new acquisition process for these facilities because of the lengthy period of time required to complete a new acquisition.

There is an urgent need to expedite the implementation of new automation technology at many terminal locations. These improvements have been on hold, due to the delay of the automation of enroute air traffic control facilities. Advanced automation for terminal airspace is now scheduled for 1997 at the earliest. The existing terminal facility automation equipment is 1960-vintage, capacity-constrained technology. The equipment is increasingly difficult to maintain, and must be replaced. The Terminal Advanced Automation System element of the Advanced Automation System is fundamental to the need for terminal automation and must be accelerated, so that FAA can implement the technology at high priority terminal airspace facilities. In addition a decision must be made soon on modifications that may be needed to TAAS to satisfy requirements of the 170 smaller TRACONS.

Unfortunately, while the aviation user community is moving forward with technology advancements applicable to the future of air traffic control, the FAA continues to lag seriously in this area. For example, the first Boeing 747-400 equipped with fully certified avionics capable of automatic dependent surveillance satellite data communication (SATCOM) was delivered in September 1990 to United Airlines. ATA member airlines worked vigorously with the aerospace industry and the FAA for several years to achieve this objective. United States and international airlines, as well as international business aviation are taking delivery of many more aircraft equipped with this capability. The improvements to oceanic air traffic control are vital to achieving an acceptable return on investments made by the airlines and business aviation. We expect the delivery rate of new aircraft equipped with SATCOM to increase and some airlines will be retrofitting some of their aircraft with satellite communication and the Global Positioning System (GPS) for navigation. The airlines are relying heavily on the planned ATC system automation improvements for increased capacity in oceanic airspace.

We recently discovered that FAA has made no provisions to implement air ground data link communications in ISSS. The airlines have spent millions of dollars developing and pursuing certification of data link communications in anticipation that FAA will have the capability to accommodate data communications in the near future. Many of the airlines have recognized the value of data communications and have been using it in place of voice communications for many years.

Additionally, oceanic automation is impacted by the delay in AAS. The tools controllers are using to control aircraft over the ocean are the same as they used in the 1950 era. Oceanic Controllers are still using maps, plexiglass, string and grease pencils to plan oceanic air traffic. The Oceanic Display and Planning System (ODAPS) contract was awarded in 1985 and still hasn't been completed. The latest estimates for full operational readiness of the ODAPS system in New York is 1995--ten years later at a cost of more than 50 million dollars. FAA intended to incorporate the ocean automation function in the AAS but now is considering another separate procurement due to the delay in AAS. Does this mean that the ocean air traffic controllers will wait another ten years before they have adequate tools to control aircraft over the ocean?

We believe it will be possible to achieve an increase in controller productivity and efficiency of operation for users through improved automation, followed by the implementation of data communication, and ultimately, a substantial reduction in standard separation minima using satellite communication and navigation in the oceanic ATC system.

What Should We Do?

ATA had the opportunity to meet with FAA and IBM leadership a few days ago to help us to better understand the dilemma and to consider a constructive course of action.

FAA's Acting Administrator Del Balzo acknowledged that perhaps the most serious causes of the present situation were of FAA's own making. The most important, incredibly, has been the lack of active involvement of top management in the resolution of the growing difficulties. Perhaps most important, top management did not adequately monitor the process of laying out and then controlling the functional requirements the contractor was expected to meet. It is clear now that continuous, well-meaning changes in the details of what was actually required of AAS created a serious, self-imposed problem for FAA. The process of establishing requirements went on far too long without crystallizing the design, and the learning processes and changing perceptions by successive groups of ATC people kept the system needs and specifications in flux, exacerbating delay and cost problems. As noted above, that process created a situation in which delay and cost rose as new requirements kept being added. During the process IBM lost control of the program's baseline.

We believe that the steps now taken and announced by FAA are prudent and we support them, subject to the recommendations below and assuming continuing vigilance and discipline by FAA and the contractor to assure that valid controller and user concerns are accommodated without generating additional delays. We believe the real challenge is to assure continuity of purpose and leadership to keep this program on the proper path.

Recommendations

As previously stated, we cannot allow the cancellation of AAS and start over. We agree that the proposed schedule of first operational commissioning of the Initial Sector Suite System in October 1996 is probably the best that can be achieved, but we believe this schedule milestone must be strictly adhered to. We further recommend that FAA restructure the AAS contract to insure the early completion of elements which can be fielded to achieve early benefits: ISSS and TAAS. If Congressional relief is needed to empower FAA to undertake such restructuring, we urge that such relief be given.

The first commissioning of real automation aids for controllers which will improve the system operation can't be allowed to be delayed until after 2000. Therefore, we recommend that FAA:

1. Establish an internal advocate for the needs of the airspace users to balance these needs with the needs of the FAA organizations. We believe a "new contract" between FAA and the users is essential if user support for the program is to continue. We recommend that FAA, perhaps through this inside advocate, work with the user community on a reoccurring basis, possibly quarterly, to provide regular reviews of schedule and cost milestones as well as candid advice on obstacles that are impeding timely deployment in the field.
2. Proceed aggressively with the Interim Sector Suite System as the foundation for what is to follow, freezing requirements soon, resolving remaining open issues and establishing a discipline for dealing with changes in requirements. Establish October 1996 first commissioning as a firm date.
3. Decide soon on FAA facility consolidation. If the development and implementation of AAS is to proceed sensibly, it is essential that the long delayed decision on FAA facility consolidation be made rapidly. Additional uncertainty, costs and delays must be expected if the consolidation decisions are further delayed.
4. Pursue aggressively the early implementation of the Automated Enroute Air Traffic Control System (AERA) functions and introduce the capability in Seattle immediately after

commissioning of ISSS in order to provide valuable benefits to airspace users.

5. Proceed rapidly with the development of the Terminal Advanced Automation System (TAAS) as the appropriate system evolution for major terminals (TRACONS).
6. Move rapidly to system decisions with respect to the right solution for smaller TRACONs, recognizing the benefits of using the already written TAAS software and AAS contractual arrangements for these systems.
7. Pursue aggressively early implementation of the Terminal Area Traffic Control System, starting with the Center TRACON Automation System (CTAS), initial CTAS applications should be on existing ARTS-III systems at facilities with digital displays and their enroute facility counterparts. Plan on the earliest possible national implementation of TATCA capabilities (and related airport surface automation capabilities) on the TAAS.
8. Review, and reach decisions within 12 months, as to whether the Area Control Computer Complex (ACCC) and the Tower Control Computer Complex (TCCC) are still the best solutions. As needed, modify the system architecture to encompass the new requirements.

In conclusion, we are reassured by the intervention of IBM's Federal System Corporation CEO Gerry Ebker in the management of AAS day-to-day activities. He brings a wealth of experience, tenacity and discipline to the process that is sorely needed. However, I would feel more confident about the FAA's management of AAS if Messrs. Hurley of Air Traffic and Kelly of Airways Facilities continued to play a permanent and more formal role in the AAS program management and reported directly to the FAA Administrator.

We must press on to complete modernization of the air traffic control system or we will face unacceptable consequences -- foregone opportunities to improve safety and unacceptable air traffic delays. As the economy improves, the number of flights handled by the air traffic control system will increase. Delays will also increase, with the attendant economic inefficiencies that have become all too commonplace in recent years. We must continue to pursue those ATC modernization programs that will improve safety as well as economic efficiency for airlines, passengers and shippers dependent on domestic and oceanic air traffic services.

This concludes my statement, Mr. Chairman. I would be pleased to answer your questions at this time.

TESTIMONY OF

JOHN F. THORNTON,

SENIOR DIRECTOR - LEGISLATIVE AFFAIRS

BEFORE

THE AVIATION SUBCOMMITTEE OF THE

HOUSE PUBLIC WORKS AND TRANSPORTATION COMMITTEE

ON

DELAYS, TECHNICAL PROBLEMS, AND COST ESCALATION
IN THE FEDERAL AVIATION ADMINISTRATION'S
ADVANCED AUTOMATION SYSTEM

MARCH 10, 1993

NATIONAL AIR TRAFFIC CONTROLLERS ASSOCIATION MEBA/AFL-CIO
Suite 845 • 444 North Capitol Street, Washington, D.C. 20001 • 202/347-4572

Good morning Mr. Chairman. My name is John F. Thornton, and I am the Senior Director of the National Air Traffic Controllers Association. My area of responsibility is Legislative Affairs.

As you know, NATCA represents the 14,700 air traffic controllers employed by the Federal Aviation Administration (FAA). We are pleased to share our views and concerns with you today on the Delays, Technical Problems, and Cost Escalation in the Federal Aviation Administration's Advanced Automation System (AAS). This is not only an air safety issue; but, in these difficult times, it is a very important national economic issue. We applaud you and your Subcommittee for the leadership role that has always been exhibited in the air safety arena.

The worst kept secret in the aviation community is that NATCA and the FAA have had serious disagreements over the development and implementation of new technology, especially those technologies around AAS. We felt that controller input was being ignored and that the FAA was allowing contractors to decide what would be best for the ATC working environment. The fact that we are having this hearing would suggest that our estimation has been correct.

We are not here today, however, to throw darts at the FAA or even the contractor. Like you and your Subcommittee, we want to see where we are, what can be salvaged, or, for that matter, if anything should be salvaged.

In 1983 when the Advanced Automation System was being discussed conceptually, controllers looked at it with guarded optimism. It was hoped that the AAS "concept" would do everything that we were being told that it would do. Unfortunately, the AAS problems began in the design stage. The new Initial Sector Suite System (ISSS) looks great; but, is it functional?

I visited the Demonstration Design Facility (DDF) earlier this week for a briefing on AAS/ISSS and was given the opportunity to play with the ISSS. I have to tell you that it was a lot of fun, my eyes were wide and I admit to a shortness of breath. Then as I worked past the feeling of awe, I realized that this new set up was more labor-intensive than what we are doing today. For example, a controller today only has to turn a knob to project a vector line on his or her scope. This vector line allows a controller to see an aircraft's projected position for one, two, four, six or eight minutes and to become aware of any potential conflicts in the projected route of flight. It is a very valuable tool and is utilized often. With ISSS, if a controller wanted to utilize the vector line, it would require 16 key strokes. Not only is this more labor-intensive; but, it causes the controller to remove his or her focus from the scope to a computer key pad. Potentially dangerous.

Another example is the new command system for computer functions. Today a controller can hit a switch or type in **FP** and the aircraft's computer identification number to obtain the aircraft's flight plan. With ISSS, a switch is not available to the controller, he or she will have to type in **RO** and the computer identification number to obtain the flight plan. So not only must the controller type in a command -- he or she must type in a new command. Although this may seem like a petty complaint on our part, you have to understand that with ISSS the controller will have to learn over a hundred new commands. We believe that when possible, the commands should remain the same as present.

Also, as you know, control positions are combined and decombined often depending on time of day and traffic demand. Currently, this is a fairly common and easy process. Necessary condition and/or advisory information is passed between controllers on a sheet of paper or is written with grease pencil on an easily viewed plexiglass board. With ISSS, that necessary information will have to be retyped into the new position when combining or decombining. This could be a very time consuming process during a peak traffic period.

Most human factors experts say that you should fit the machine to the man or woman, not vice-versa. The FAA has a human factors team in place, with respect to AAS, and it is known as the Computer Human Interface team. Obviously, the FAA's emphasis is on the machine. NATCA believes that the emphasis should be on the human and the machine should be made to fit the human needs.

The problems encountered by the FAA on AAS further convinces us that the Agency is in dire need of restructuring. Not only does it need a streamlined procurement process; but, along with strong congressional oversight, there must be a way for the users of the system to have increased authority. NATCA believes that the answer to many of the FAA's problems could be solved by restructuring the Agency as a quasi-government corporation. Certainly, the handling of AAS underscores the need. We submitted such a proposal to Candidate Clinton in September 1992. I am attaching a copy of our proposal to this testimony for you.

Where do we stand now and where should we go? Clearly, to date AAS, has not been managed well. But, we do not believe that it should be scrapped nor that we should start over. Air traffic controllers are looking for better Plan View Displays (PVD's aka M1 Console), more reliable equipment and AAS, at least in part, shows the most promise of being able to deliver.

NATCA President Barry Krasner recently met with Acting Administrator Joe Del Balzo to discuss AAS and the challenges facing the air traffic control system in the near future. As a result of that very open and honest meeting, President Krasner is very optimistic and views Del Balzo's involvement in the project as pivotal. During their exchange, NATCA has been promised increased and more direct involvement in the project. With those assurances and with faith in Mr. Del Balzo's ability, we recommend that this Subcommittee accept the FAA's proposal to continue with the delayed AAS project.

Again, thank you for the opportunity to appear before you this morning. I am prepared to answer any questions that you may have.

A Proposal to

Governor Bill Clinton

On the Formation of a Federal Corporation

To Operate and Regulate the Nation's

Air Traffic Control System

Prepared By

The National Air Traffic Controllers Association, AFL-CIO

September 1992

Proposal

The National Air Traffic Controllers Association, AFL-CIO, proposes the creation of a federal corporation to run the nation's air traffic control system. We believe that such an innovative measure is necessary if the nation is to address the long-standing problems associated with the safety and efficiency of the system and respond to the dynamic changes of the 21st century.

Background

Following the firing of striking air traffic controllers in August 1981, the Federal Aviation Administration (FAA) embarked on a massive rebuilding and modernization of the nation's air traffic control (ATC) system.

Because of the Reagan Administration's steadfast refusal to rehire any of the fired controllers, the Department of Transportation and the FAA were faced with the daunting task of hiring and training more than 10,000 new controllers from scratch.

However, promises that the system would be rebuilt in two to three years fell flat. The Reagan Administration tried to cover-up the failure of its rebuilding efforts through "cooked" staffing numbers and rosy reports of state-of-the-art technology. All evidence was to the contrary.

Most busy air traffic control facilities were so short-staffed that six day-weeks, every week, were the norm. Controllers were driven to accept more traffic than common sense and safety dictated. And they were working with antiquated equipment that was unreliable and prone to breakdowns. It was not unusual, both then and today, to find hardware at ATC facilities dating back to the old Civil Aviation Administration of the 1950s.

Near mid-air collisions and long delays at airports became the grist of the evening news, and banner headlines of "Gridlock in the Skies" were commonplace. The American flying public and the Congress demanded that something be done.

Yet the Administration did nothing. An exasperated Wendell Ford (D-KY), Chairman of the Senate Aviation Subcommittee, finally said that he had to "force feed" controllers to the FAA. To this day, 11 years after the strike, there are not enough qualified air traffic controllers to handle the air traffic workload.

An already intolerable situation was made worse with the lifting of flight restrictions several years after the strike. Air traffic went through the ceiling and a sluggish FAA, hampered by poor predictions, mismanagement and government regulations could not get available modern technology to controllers who were begging for increased staffing and new equipment to carry out their mission.

The FAA believed that salvation lay in the National Airspace System Plan (NAS Plan), later renamed the Capital Improvement Plan (CIP). Initiated in 1981 and aimed at a total overhaul and modernization of the ATC system, it is the largest single civilian procurement since World War II.

However, the FAA and its contractors seriously underestimated the risk and complexity of developing highly-automated systems. The CIP is in a shambles; it is hopelessly over budget and years behind schedule. The FAA quickly gained the reputation of the "gang that couldn't shoot straight". Some congressional critics have gone so far as to call for the scrapping of the NAS Plan/CIP and starting over from square one.

An Independent FAA

Against this backdrop of chaos and public outcry, Congress began a serious examination of the FAA and its structure. Three key points quickly emerged: (1) the FAA was being micro-managed by the Department of Transportation; (2) there was no continuity in FAA leadership; and (3) the Agency's multi-billion dollar trust fund was not being fully used to modernize the ATC system but, rather, to offset a cancerous budget deficit that was growing by the day.

In 1987, Senator Ford introduced S. 1600, creating an "independent" FAA outside the Department of Transportation. The new agency would be charged with maintaining and improving the ATC system and aviation safety; all functions relating to the promotion of civil aeronautics and air commerce would remain in the Department of Transportation. The aviation subcommittee chairman also promised a steady stream of funding consistent with the authorization process.

At the behest of the airline industry, Senator Daniel Inouye (D-HI) introduced S. 1159 to create the National Aviation Authority, an independent, user-fee supported government corporation that would operate, supply and maintain the ATC system. Under S. 1159, the FAA would continue to exist as a regulatory and safety oversight body.

It soon became clear that S. 1600 was the horse to bet on. Former FAA administrators who were frustrated by White House and DoT tinkering and stifling oversight quickly lined up in back of an independent FAA. Virtually the entire aviation community, including NATCA, lent their name to the legislation. The Air Transport Association saw that S. 1159 was going nowhere and threw their support to S. 1600.

However, the S. 1600 bubble quickly burst over funding. Special budgetary treatment that would place the new Agency out of the reaches of Gramm-Rudman-Hollings sequestrations proved to be its undoing. Heeding threats by the Senate Budget Committee's leadership, Senator Ford removed the offending budget language.

However, without a guaranteed steady stream of funding outside the vicissitudes of the unified federal budget process, the bill was gutted. It became more of a question of reform for reform sake. and it would have accomplished nothing.

A year later, Senator Ford came back with an amended S. 1600 that would fund the agency through user taxes and the interest upon them. Appropriations committees would be involved in the FAA budget only to the extent that the receipts and interest did not cover operating costs. Further, the Aviation Trust Fund account would be excluded from calculations used to determine the federal budget deficit and would not be liable to sequestration. FAA programs would be subject to congressional authorizations and appropriations every two years. S. 1600 never even got to subcommittee markup.

It was then business as usual at the FAA; Administrators came and went, and the Agency and its vital services were being used by the Office of Management & Budget to force an agreement on the budget deficit. This guerilla warfare waged by OMB Director Darman reached a hysterical peak in 1990 when he threatened a furlough of air traffic controllers unless a budget deal could be reached.

For the first time in recent memory, controllers actually received furlough notices. OMB warned that the "air traffic control system would turn into chaos" and that a "major cutback and disruption in 1991 would affect air travellers for at least three years due to recovery problems." Unfortunately, it was a fair assessment.

At the last moment, the furloughs were averted but the lesson was obvious. What occurred in 1990 could easily happen again -- the FAA would be sacrificed time and again on OMB's altar. The Agency could not depend on guaranteed funding and would have to compete every budget cycle with scores of other federal agencies making their own valid appropriations claims.

Effects of FAA Funding on Controllers

These budget wars have an immediate and long-term effect on controllers and the operation of the ATC system. Uncertain and inadequate funding can hamper, if not freeze, new hires and suspend the training of developmental controllers, especially crucial on-the-job training which is handled by full performance level controllers. Cutbacks and sequestrations also curtail the purchase of new, critical equipment for modernization of the ATC system.

Recent surveys by the General Accounting Office also show a controller workforce still demoralized and dispirited by inadequate staffing and FAA recalcitrance. Eleven years of unfulfilled promises have been a very bitter pill to swallow. The furlough threat and last year's proposed phase-out of a 5 percent controller operational differential further salt the wounds.

NATCA also contends that the annual wrangling over the FAA's budget will make it increasingly difficult to attract and retain qualified controllers. The present structure and funding of the FAA sends the wrong message at the wrong time: a career as an air traffic controller is not only extremely stressful, but job security is shaky at best.

A New FAA: The Federal Corporation

The time has arrived for a bold new approach to the FAA's problems. An independent FAA in and of itself is not the answer; it would merely move existing problems to a new venue and would not address the vagaries of the federal budget process. Moreover, any reorganization of the FAA must not be a further drag on the federal government's crushing budget problems.

Therefore, upon the election of Governor Bill Clinton as President of the United States, NATCA urges serious and swift consideration of a quasi-government corporation to operate the nation's air traffic control system and to ensure its safety. NATCA would further urge the President-elect to reject any proposals to "privatize" the ATC system or contract-out vital operating and safety functions.

Structure and Function of the ATC Corporation

The National Air Traffic Controllers Association believes that much of what was contained in S. 1159 and the amended S. 1600 can be used or modified to create the new government corporation or Authority.

The new Authority would meet six essential goals: (1) modernize the air traffic control and airports and airways systems; (2) provide funding stability; (3) ensure autonomy and eliminate excessive layers of oversight; (4) increase the efficiency of the ATC system; (5) provide for an integrated safety system; and (6) assure fairness and equity to system users.

Purpose and Authority

Under NATCA's proposal, the new authority would retain all of the powers and functions currently held by the FAA. Some other plans, such as the one advanced by the Air

Transport Association and former DoT Secretary James Burnley, would split the functions of the FAA into two separate entities: the government corporation (National or Federal Aviation Authority) and a residual FAA dedicated to safety oversight and regulation.

NATCA contends that it is essential to keep all of the FAA functions under one roof -- a view held by the President's Aviation Safety Commission. Safety must be regarded as an integrated system in which all elements are coordinated to achieve maximum operational safety, efficiency and reliability. Rules and regulations that define safety requirement must also be part of any decisionmaking or operational process lest we create a new layer of unnecessary management and oversight.

In 1986, the National Academy of Public Administration argued that a commonly-accepted group of authorities and capabilities, similar to those found in the Tennessee Valley Authority, should be conveyed to the new Federal Aviation Authority.

NATCA concurs with the Academy's finding. The new ATC corporation should have the authority to: (1) retain and utilize revenues; (2) sue and be sued and to conduct litigation in its own name: (3) enter into contracts and to acquire and dispose of property without regard to statutes generally applicable to government agencies; (4) maintain bank accounts; (5) borrow for the defined purpose of the Authority; (6) make grants and loans, and to provide loan guarantees for airport development; (7) submit a business-type budget as provided by the Government Corporation Control Act; (8) determine the character and necessity of expenditures; (9) hire and fix the compensation of officers and employees without regard to civil service laws; and (10) acquire needed office space.

Funding

As previously described, the future of the FAA will be determined by the ability to remove the Agency from the federal budget process. Artificial spending limits are arbitrarily capping system capabilities. We have chosen by default to utilize only a portion of the system's capabilities.

However, taking the FAA "off budget," while an improvement, does not go far enough. It is necessary to design a funding mechanism of user fees that will be translated directly into system support. The Aviation Trust Fund does not meet this challenge.

As a government corporation, the Authority would establish a schedule of user fees calculated to fund its operations, research, investment and development programs. For the first two years, user fees would remain at current tax levels. Thereafter, and subject to congressional approval, fees could be adjusted to offset expenses.

The initial capital of the Authority would consist of the accumulated Aviation Trust Fund balance. As mentioned in the above section, the Authority could borrow money and issue and sell obligations.

Personnel and Procurement

Perhaps nothing better symbolizes the FAA's inability to carry out its mission than its rigid personnel and procurement procedures. Over the past decade, the FAA has experienced great difficulty in not only attracting and retaining qualified air traffic personnel, but placing them where they are most needed.

The cookie-cutter Civil Service System is ill-suited to meet FAA's personnel needs. For example, it is extremely difficult to move controllers to high-density facilities in high cost-of-living areas. Even Secretary Burnley said that "federal law won't allow us to recognize what every private company does when relocating their employees: you have to pay people more if you expect them to transfer to cities where it costs more to live. ,Otherwise, they will quit rather than have their standard of living slashed." Once again, there is plenty of room for expanding system capacity. The problem is applying the money and talent to get the job done.

Procurement is another bottomless pit. Federal procurement rules are so byzantine and time consuming that a major systems acquisition is **anticipated** to take between one and two years with over 150 sign-off stops. This does not even take into account the lengthy appropriations and authorizations process.

What this means is that by the time "new technology" finally gets into controller hands, it may already be a relic. The FAA is unable to respond to rapidly changing needs and technology.

Under the ATC government corporation proposed by NATCA, the Authority would no longer have to operate under the Civil Service System and its rigid pay scales and regulations. Through negotiations with unions and employee representatives, the Authority would be able to develop its own personnel and pay system applying the best human resource techniques from the private sector and elsewhere. It would create a new and vital work environment in which there would be greater opportunities for employees to advance and enhance their own skills and performance.

From a labor relations standpoint, the Authority could enter into collective bargaining agreements with any current or future labor organization holding exclusive recognition for a period not to exceed three years. All such activities would come under the auspices of the National Labor Relations Board rather than the Federal Labor Relations Authority. NATCA also favors binding "baseball" style arbitration on failure to reach a collective bargaining agreement within 180 days of the commencement of talks.

On the procurement side, the system should be simplified on the basis of sound business principles. It is essential to free the Authority from cumbersome government-wide procurement regulations and allow the new Authority to establish its own procurement policies and procedures. It would not take much to improve on today's catch-as-catch-can method of awarding contracts and monitoring and managing contractor performance.

Leadership

The FAA has been roundly criticized for the amazingly short tenure of its administrators; two years is about average. Most of the administrators have barely learned the workings of the agency when they resign. Every single proposal for an independent FAA or government corporation addresses the need for a fixed-term administrator.

An independent FAA, as created by S. 1600, would be under the control of an Administrator appointed to a seven-year term by the President and confirmed by the Senate. The government corporation envisaged in S. 1159 would be under the direction and control of the "Director" appointed to a ten-year, non-renewable term by the President and confirmed by the Senate. The model is based on a corporate chief executive officer. The Authority's CEO would not report to the Secretary of Transportation. NATCA prefers the CEO or director model and is flexible on term limits.

Oversight

It is imperative that the Authority be freed from paralyzing meddling and micro-management by both the Administration and Congress. However, it is equally important that some sort of oversight and accountability exist.

NATCA believes that this could be accomplished through the creation of a Policy Advisory Board consisting not only of the Secretaries of Transportation and Defense and the ranking chairpersons of the House and Senate Aviation Subcommittees, but expanding this group to include representatives from the National Transportation Safety Board, air traffic controllers, airline pilots, general aviation, airports and other users of the ATC system as deemed necessary. The Board could also call upon other technical experts and aviation groups as needed.

The Board would meet semiannually to review operations and future plans of the Authority and advise on the effectiveness of those plans in a written report to the President, Congress and the Authority CEO.

Conclusion

The Clinton Administration has a wonderful opportunity to provide for the superior operation of the nation's air traffic control system. A federal corporation would offer substantial advantages to current FAA management without inflating the budget deficit. The providers and users of the system would reap the benefits through greater safety and efficiency. Old prescriptions and nostrums will only have a toxic effect on the FAA; it is time for a new remedy that will invigorate this crippled yet vital agency and carry it into the 21st century.

ADDITION TO THE RECORD

NAATS

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STATEMENT OF

THE NATIONAL ASSOCIATION OF AIR TRAFFIC SPECIALISTS

CONCERNING

DELAYS, TECHNICAL PROBLEMS, AND COST ESCALATION IN THE FEDERAL AVIATION ADMINISTRATION'S PROGRAM OF MODERNIZATION AND AUTOMATION

BEFORE THE

AVIATION SUBCOMMITTEE OF THE

HOUSE PUBLIC WORKS AND TRANSPORTATION COMMITTEE

Submitted by
Gary D. Simms
Executive Director, NAATS

The National Association of Air Traffic Specialists (NAATS) is pleased to submit this statement concerning delays, technical problems, and cost escalation in the planning and implementation of various modernization efforts by the Federal Aviation Administration (FAA).

NAATS is an organization recognized under the Labor Management provisions of the Civil Service Reform Act as the exclusive bargaining representative for more than 3,000 employees in the FAA. Our members serve the public through the Flight Service option of air traffic control,. They provide critically important weather, routing and other flight assistance briefings and emergency services for general aviation across the United States. To that end, we wish today to stress the following points:

(1) The number one concern of NAATS and the individuals it represents is the continued safety of the flying public. We are concerned that the FAA's more than 10 year history of project mismanagement, consolidation, and automation has resulted in the waste of billions of dollars and has failed to enhance the safety of the general aviation public.

(2) The Advanced Automation System (AAS), a multibillion dollar program to revamp the nation's air traffic computer hardware and software, is years behind schedule, years from implementation, and will never achieve the benefits which have been promised.

(3) The Advanced Weather Observation System (AWOS), the first weather observation automation project under the auspices of the FAA and the National Weather Service has severe weaknesses which render its data output of questionable utility or validity.

(4) The Advanced Surface Observation System (ASOS), an attempt to refine and enhance automated weather observation , has been demonstrated to be a miserable substitute for trained, professional human observers, who can do a better job for less money, more effectively and more efficiently.

(5) The Direct User Access Terminal System (DUATS), touted as yet another automated system to replace personal weather briefings for the general aviation pilot, has been shown again and again to be a data source only, one for which considerable concern has arisen not only from Flight Service Specialists, but also from the general aviation public.

These are illustrative of the type of colossal mismanagement of contracts, the shortsightedness which has been a hallmark of FAA planners, and an almost ideological commitment on the part of the FAA to automation for the sake of automation, regardless of the long term cost-benefit analysis. Put another way, the FAA continues to plan for the future with tools of the past. At a time when 486 computers are replacing 386's, the FAA is placing its bets on computer technology which is now off-the-shelf, and will be hopeless outdated by the time it is implemented.

This statement will detail our observations on each of these key points.

(1) The number one concern of NAATS and the individuals it represents is the continued safety of the flying public. We are concerned that the FAA's more than 10 year history of project mismanagement and consolidation has resulted in the waste of billions of dollars, and has failed to enhance the safety of the general aviation public.

The basic issue now facing Congress and the new Administration is very much the same issue faced for more than a decade. Congress during that time frame has appropriated billions of dollars to the FAA for automation and modernization of the nation's airports and air traffic system. But even as the level of expenditures has risen, the number of facilities and flight service specialists manning those facilities has decreased. In detailed interviews with general aviation pilots across the country, we have found that time after time the general aviation public wants more service from knowledgeable Flight Service Specialists - and not from automated facilities where the telephone lines are tied up. FAA seems set on a philosophy of automation to cut jobs - but the critical issue is not one of cost but one of safety.

When the Reagan administration sold the concept of Automated Flight Service Stations to Congress in 1981, it was sold as a means to reduce costs. By 1990, with almost the entire automated flight service system implemented, we could see money was not being saved, and in fact costs were increasing as the system was implemented.

This is but one example in the long history of FAA mismanagement, and their propensity of promising more than they could deliver. In the FAA's headlong rush to automate, they have missed virtually every deadline and have failed many, if not most, operational tests. Frequent expressions of doubt by the General Accounting Office over the years, by users , and by Congress have done little to stem the urge to privatize the dissemination of weather information by the FAA.

(2) The Advanced Automation System (AAS), a multibillion dollar program to revamp the nation's air traffic computer hardware and software, is years behind schedule, years from implementation, and will never achieve the benefits which have been promised.

As recently reported in The Washington Post, the Advanced Automation System (AAS) the hallmark of the FAA's policy of automation, is hopelessly behind schedule. While the press reported delays of 14 months, the fact remains that this program has been on the drawing boards for more than a dozen years, it has missed every benchmark in the timeline, and it continues to be highlighted by questionable contracting practices.

Acting Administrator Del Balzo, while portrayed as taking quick and appropriate action with the contractor to eradicate existing problems, is nowhere mentioned as the motivating force behind the Microwave Landing System, another boondoggle of immense proportions. It is another example of FAA's continual promise to provide a product by a time certain, and then to reset the watch (or the calendar) as the year for implementation approaches.

In the present case, as the press points out, the contractor is using currently available off-the-shelf technology for a program that even in the best of all possible worlds will not begin implementation for at least another three years. It is unconscionable to permit the FAA to squander billions on this program where obsolescence is assured even before the planning stages are completed, at a time when citizens across the country are being asked to sacrifice through reduced government services and increased taxes. How upset would the American public be if they understood that FAA is spending billions now, and will spend billions more, on a system which will be obsolete before it goes on line.

FAA has demonstrated time and time again a "Rosie Scenario" approach. In an almost annual rite, FAA appears before Congress and announces that a new delay has arisen, that last year's target has been deferred, but that at long last the problems have been ironed out and management difficulties have been overcome, and that the future is bright. And in the following year, as has happened once again this year, FAA again promises that its management problems have been resolved, and that the target deadlines are now set in stone and will be achieved. We have little reason to rely on the credibility of an organization which has demonstrated time and time again that their credibility is minimal.

And who will pay for FAA's mismanagement? At the March 10 hearing before the House Committee on Public Works and Transportation, Subcommittee on Aviation, the Acting FAA Administrator acknowledged that the several hundred million dollars additional expense caused by the delay will be "negotiated" with the contractor, with no assurance that these costs will not be passed along to the taxpayer.

And far from being remedied, the problems are in fact getting worse. As the GAO reported at the same hearing, "Schedule and cost problems have worsened over the past year....The total delay in this segment is now about 3 years from the milestones established in 1988. Because of recent problems, the cost of AAS may increase by another $235 million. In addition, delays in AAS have forced FAA to initiate several costly interim projects to sustain the current air traffic control system." The GAO also reported on significant underestimates of efforts needed in AAS. And they also underscored that FAA must face up to the problem of adapting the AAS to a shifting target of needs, to unclear consolidation programs, and FAA indecision.

(3) The Advanced Weather Observation System (AWOS), the first weather automation project under the auspices of the National Weather Service and the FAA, has severe weaknesses which render its data output of limited and questionable utility or validity.

For the benefit of the reader, we offer the following brief synopsis of the AWOS program.

Prior to the onset of any automated weather observation system (as is still the case where automated systems are not installed), human observers were required to take (at least) hourly observations of a full range of parameters: ceiling, visibility, air pressure, temperature, dew point, wind direction and speed, and the altimeter setting. "Special" (additional) observations may be required due to shifting weather patterns. Beginning in the early 1980's, the Automated Weather Observation System (AWOS) was introduced by the National Weather Service (NWS) and the FAA, to provide automated measurements of "ambient" (general) readings, such as temperature, dew point, wind direction and speed, under the assumption that these AWOS systems would be situated in areas where human observers had not previously been located. Mechanical problems became immediately obvious. As AWOS expanded, most units were purchased by state and local governments and local airport authorities to locate them at places where FAA or NWS observers had never been located.

An advanced version of AWOS (called AWOS III) has also begun deployment, with claims for additional capabilities (in ceiling measurement and visibility measurement). These do not work well, require high levels of maintenance, and offer limited enhancements to the system. Information from these systems feeds directly into the FAA system through the Weather Message Switching Center (WMSC). While there had been relatively little concern about AWOS I (due to its simplicity and due to the fact that "some data is better than none"), additional questions have arisen with respect to AWOS III because raw data, including ceilings and visibility, is fed directly into the FAA's weather reporting system. It may be a big help for the big weather picture, but is a potential danger for use in a small, specified area where the weather is rapidly changing - precisely the danger general aviation faces.

AWOS has no present weather reporting capabilities (because it is providing an average), and maintenance by the contractor to date has been, at best, incomplete. The FAA has played down this significant problem for many years. In addition, controllers failed to receive training until after the system was implemented and operational. Even thereafter, training efforts have lagged, and have been incomplete.

(4) The Advanced Surface Observation System (ASOS), an attempt to refine and enhance automated weather observation, has been demonstrated to be a miserable substitute for trained, professional human observers, who can do a better job for less money, more effectively and more efficiently.

The Automated Surface Observation System (ASOS) has been called a "gold plated AWOS" and is being developed primarily by FAA. Contrary to most AWOS systems, ASOS is being deployed in locations where human observers are already stationed. One must ask whether the hundreds of millions of dollars being invested in ASOS deployment is designed for a limited function of adding capabilities to human observers, or is in fact designed to replace human observers.

While the theoretical concept of 1440 daily site observations by ASOS has merit, in actuality the system does not measure appropriate conditions, is subject to severe operational limitations, and cannot replace highly trained and experienced human observers, particularly in those areas where severe weather can become a sudden and unanticipated phenomenon.

ASOS operates a bit like a submarine's periscope, but instead of the panorama of the sky (the "celestial dome") one would expect with a human's visual observation, ASOS instead provides a pinhole look directly above the observation site. It is like looking through a cardboard tube pointing above one's head. While it can provide a good look at that spot of sky, it doesn't offer much in the way of surrounding weather.

When a critical element of ASOS equipment goes off-line, a not infrequent eventuality, down time can be extensive. Acting through admittedly ingenious laser based sensors, the system is prone to interference from sources such as nesting insects (which seem to enjoy the canister containers), bird excrement masking the sensors, smoke from forest fires, power failures, and even from storm activity. Airborne distortions can also take effect.

But most significantly, ASOS consistently reports incorrect weather observations and it is endangering the safety of air travel. Simply stated, the system is unreliable, and the information it passes along to end users (the flying public) puts their lives in jeopardy. A December 18, 1992 memorandum from the FAA's Air Traffic Manager in Colorado Springs highlights numerous problems with the ASOS commissioned at that location on November 1, 1992, stating that "...ASOS does not provide accurate or timely weather. ASOS increases the workload on the controllers ...." His February 3, 1993 follow-up letter states that "...we continue to have numerous problems and complaints and discrepancies we've experienced with ASOS." He remarked that:

> "ASOS has caused a decrease in the service we provide the flying public. ASOS will report the weather as IFR when it is VFR and VFR when it is IFR. Not only does this create less service it can be a safety hazard.
>
> Until changes are made to ASOS to provide an accurate and reliable weather observation we believe that it should be removed from service.
>
> ASOS has created more work with less than satisfactory results. In order for us to provide the most safe and orderly service to the flying public we need a system that is accurate and reliable."

To put this letter into appropriate context, it is noted that aircraft operations are restricted by the worst reported weather conditions. In this particular case, when ASOS erroneously reported limited visibility, the controller could not legally clear the aircraft for approach, even though the controller, through personal observation, knew that visibility was far superior to that reported by ASOS, and that the aircraft could approach the airport safely. Thus, a system designed to enhance safety created a potential hazard.

These observations are confirmed by the comments made by the Aircraft Owner and Pilots Association (AOPA), which has stated that:

> "AOPA's investigation into the manned versus automated weather observing clearly indicates that under adverse weather conditions that ASOS continuously misrepresents ceiling and visibility and provides little or no elaboration of weather phenomena observed."

And the National Air Traffic Controllers Association (NATCA), the union which represents air traffic controllers, has added its doubts to the capabilities of ASOS, as has the National Weather Service Employees Organization, the union representing employees at the Weather Service who work most closely with ASOS.

ASOS cannot, and never will be, a substitute for the human observer, a fact acknowledged by the Commerce Department's National Climatic Data Center in a November 19, 1990 letter. The ASOS User's Guide itself, the document which is designed to explain how the system operates, notes that the system is not designed to detect tornadoes, thunderstorms, hail, very light freezing rain, freezing drizzle, volcanic ash, ice crystals, funnel clouds, waterspouts, or lightning. These are, of course, precisely the observations most important to aviation, and precisely those which can be readily observed by trained human observers.

We would be pleased to share more technical information regarding the operation of ASOS, its software and hardware problems, and its interface with the employees who are required to use it.

(5) The Direct User Access Terminal System (DUATS), touted as yet another automated system to replace personal weather briefings for the general aviation pilot, has been shown again and again to be a data source

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only, one for which considerable concern has arisen not only from Flight Service Specialists, but also from the general aviation public.

The Direct User Access Terminal Service (DUATS) is perhaps the most controversial element of the FAA's program of technological change for the sake of technological change. In February 1990, the FAA authorized two contractors to provide this service to pilots in the United States. The service, provided via area code 800 telephone, provides the caller with basic weather information that is downloaded into a personal computer (PC). For a fee, the pilots can also have access to weather charts, public weather forecasts, and related information, again in a data download to their PCs.

Originally introduced to augment the weather briefing provided by the Flight Service system and its personnel to avoid lengthy waits on the telephone (arising out of years of understaffing and inadequate equipment procurement by FAA), DUATS provides pilots with much, but not all, of the information available to the flight service specialist. The pilot using DUATS is then expected to sift through the data, translate, interpret and apply the information. In other words, the pilot is transformed into a self-briefer, taking over the role of the trained and professional Flight Service Specialist.

This, indeed, is the central problem with the DUATS system: while the FAA may indicate to the contrary, DUATS is not an alternative for a weather briefing traditionally supplied by Flight Service Specialists to the general aviation pilot. DUATS is actually the dissemination of weather data. While Flight Service Specialists have experience and training in the interpretation of such data, the vast majority of recipients of DUATS data do not have the benefit of such training and experience. DUATS cannot compare with the first hand experience of Flight Service Specialists.

Flight Service Specialists receive extensive training on the interpretation of data distributed under DUATS, and are certified as pilot briefers. The certification process includes training regarding aircraft performance and capabilities, and on the impact of adverse weather on particular types of aircraft.

Weather is inherently changeable, and weather accounts for 50% of all aviation fatalities. The job of a Flight Service Specialist was created to help general aviation pilots avoid weather traps, and DUATS cannot serve that function. In an environment where close to 50% of all aviation fatalities are weather related, to replace the human briefer with automated data reporting systems makes little sense, and creates the potential for disaster.

Why was DUATS created as an alternative to flight service briefings? In a word, delays. Waiting times for weather briefings could rise to thirty minutes at busy times at busy locations. But FAA not only failed to increase staffing, they actually reduced staffing and reduced telephone lines, while "consolidating" facilities across the country. Why? Because hiring more personnel is not part of their technology for the sake of technology program, nor is it part of their underlying program to turn over as much of the air traffic control system to private contractors - the so-called "privatization" program begun under previous administrations. DUATS was supposed to solve the delay problem. But it does not offer to the pilot what a trained briefer can offer, and it does not satisfy the FAA's obligation to provide the public with the kind of weather briefings needed to maintain safety.

The entire range of flight service activities (preflight weather, in-flight services, flight planning , weather observation, pilot education, liaison between air traffic control and the general aviation community) is less than 1% of the FAA's operations budget. In a high-tech world of FAA dreamers, these services will fall by the wayside because of claims that technology can do a better job (see AWOS/ASOS) or because it allegedly can be provided more cheaply.

But DUATS itself is expensive. By February 1994, the FAA will have paid more than $50 million to the DUATS contractors for their five year service plan (equal to the entire Flight Service budget for a year). At a time when cost efficiency is becoming increasingly important, the reliance on DUATS at the expense of the flight service option is not only poor management - it is a danger to the safety of the aviation public.

CONCLUSION

As users of technology, we are among the first to accept and adopt appropriate technology. But the key modifier in this context is **appropriate**: not outdated technology, not unsuitable technology, and not technology which promises more than it can deliver.

The Federal Aviation Administration's history is replete with overspending, poor budgeting, contract mismanagement, and misplaced priorities, as is readily observed by a simple scan of GAO reports affirming this observation. The time has come for the management of the FAA to recognize that now is the time when government spending must be scrutinized and prioritized, when costs and benefits must be reviewed in a real world manner, and when a revolving door relationship between federal agencies and contractors is no longer an acceptable way to do business.

We would be pleased to meet with representatives of the Committee to provide further detail on matters raised in our testimony, and thank the Committee for the opportunity to submit this testimony.

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